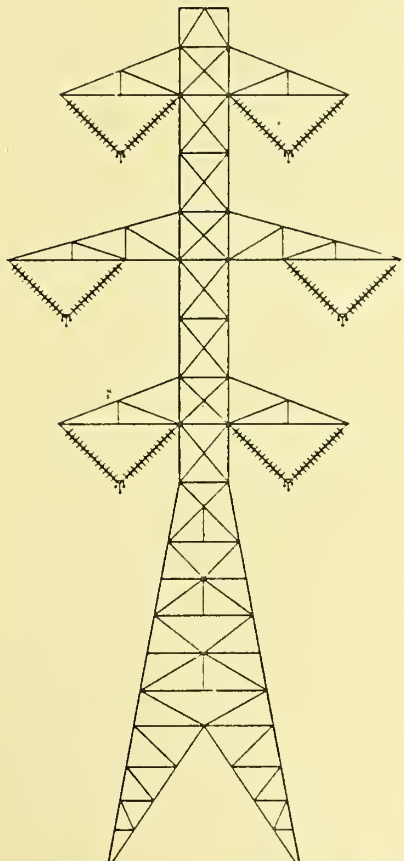
Draft Report to the Board of Natural Resources & Conservation on the Bonneville Power Administration's 500 Kilovolt Transmission Line from Townsend — Garrison, Montana



An Addendum to the Federal Colstrip Project EIS

MONTANA DEPARTMENT OF NATURAL RESOURCES & CONSERVATION DNRC

ENERGY DIVISION 32 SOUTH EWING HELENA, MONTANA 59620

APRIL 1982

DRAFT REPORT
TO THE
BOARD OF NATURAL RESOURCES & CONSERVATION
ON THE
BONNEVILLE POWER ADMINISTRATION'S
500 KILOVOLT TRANSMISSION LINE
FROM TOWNSEND - GARRISON, MONTANA

AN ADDENDUM TO THE FEDERAL COLSTRIP PROJECT EIS

Department of Natural Resources and Conservation
April 1982

TABLE OF CONTENTS

I. INTRODUCTION

This report is a draft addendum to the Federal Colstrip Project Environmental Impact Statement (EIS) and EIS Supplement (USDI 1979a, 1979b, 1981a, 1981b). It evaluates the Bonneville Power Administration's (BPA) plans to construct double circuit 500 kilovolt (kV) transmission facilities from Townsend, Montana to a new substation near Garrison, Montana. This report is for use by the Board of Natural Resources and Conservation (Board) in determining whether BPA's plans are in compliance with the substantive standards of the Montana Major Facility Siting Act (MFSA). The report also addresses the requirements of the Montana Environmental Policy Act. MEPA sets forth broad policies which require the state to create and maintain conditions under which man and nature can coexist in productive harmony and fulfill the social, economic and other requirements of present and future generations of Montanans. The broad policies of MEPA are incorporated in making determinations under the MFSA when the Board considers the specific information and standards contained in the MFSA.

The Board will hold a hearing to gather public comments on this report and other public input concerning the proposed facilities. The aforementioned federal documents are available for inspection at the Department of Natural Resources and Conservation, 32 S. Ewing, Helena and at the public libraries in Townsend, Boulder and Deer Lodge. A final addendum will be prepared in order to incorporate public comments. The Board will make its determination following publication of the final addendum.

Summary Description of the Project

The proposed transmission facilities and substation will deliver electrical energy from Colstrip Unit 3 to the existing 230 kV transmission system. The transmission facilities would be double-circuit 500 kV lines located in a 125 foot right-of-way on self-supporting stacked towers similar to the tower shown on the cover of this report. BPA's preferred route between Townsend and Garrison, labelled "BPA Final Route," is shown in Figure 1, along with two alternative routes. An average of 4.5 towers would be built per mile, depending upon terrain and structural design. The towers would be approximately 162 feet high. The project includes a new substation near Garrison, Montana; total site development for the substation would cover approximately 50 acres. BPA's original schedule called for construction of this project to begin in March 1982. The peak of the construction work force would number 150-225 persons during the summers of 1982 and 1983 in three separate construction spreads. A detailed engineering description of the project and construction activities is contained in the Colstrip Project EIS Final Supplement, Appendix A (USDI 1981b).

Background of the Board's Determination

The determination the Board must make on this project is the result of a complex series of events. An explanation of these events is central to understanding the Board's determination.

On June 6, 1973, Montana Power Company, Puget Sound Power and Light Company, Portland General Electric Company, Pacific Power & Light Company and Washington Water Power Company applied to the Board for a Certificate of Environmental

Compatibility and Public Need under the MFSA for Colstrip Generating Units 3 and 4, the 500 kV transmission lines, and other associated facilities. On July 22, 1976, the Board issued the certificate which included approval of the route for the transmission lines shown in Figure 1.

On September 26, 1977, Montana Power Company formally requested BPA to construct the 500 kV transmission lines from the western border of Montana to the Helena-Ovando area, where the lines would interconnect with that portion of the system to be built and owned by Montana Power from Colstrip (Montgomery 1981). The primary reason that Montana Power has cited for this transferral of ownership and construction responsibility is the alleged difficulty it experienced in obtaining easements along the corridor approved by the Board, particularly across the Flathead Indian Reservation. On December 2, 1977, BPA agreed to request Congressional authorization to construct the line; BPA contends that this authorization was given by Public Law 95-482, passed on October 18, 1978. (The State of Montana and Missoula County, et al. dispute BPA's authorization).

Because the transmission lines would cross federal lands, the Colstrip project owners applied for right-of-way permits from the United States Forest Service (FS) and the United States Bureau of Land Management (BLM) at approximately the same time as they filed their original MFSA application in 1973. Following the Board's decision on the certificate, the federal agencies prepared the federal Colstrip Project EIS with BPA designated as lead agency on November 15, 1976. Throughout 1977 and 1978, BPA supervised studies which culminated in publication of a document known as the Transmission Environmental Report (TER) in mid-1978. In January 1979 the draft federal EIS (Colstrip DEIS) was completed and on July 31, 1979, the final Colstrip EIS (Colstrip FEIS) was filed. The federal agencies selected the route

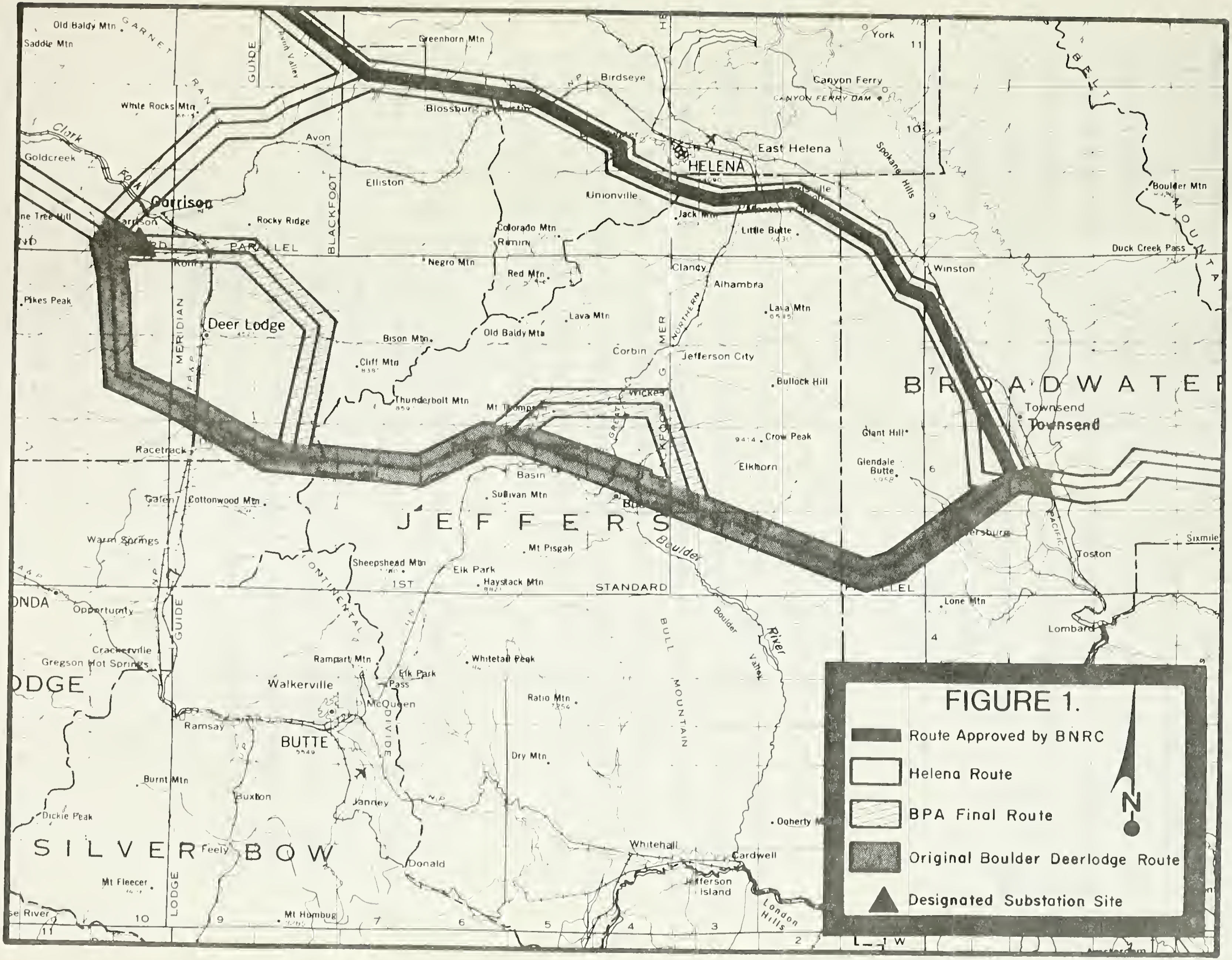

Route Approved by BNRC
Helena Route
BPA Final Route
Original Boulder Deerlodge Route
Designated Substation Site
N
HELENA
East Helena
Canyon Ferry
CANYON FERRY DAM
York
Birdseye
Greenhorn Mtn
Blossburg
Elliston
Avon
Garrison
Goldcreek
Old Baldy Mtn
Saddle Mtn
White Rocks Mtn
Rocky Ridge
Deer Lodge
Pikes Peak
Racetrack
Cottonwood Mtn
Warm Springs
Opportunity
Crackerville
Gregson Hot Springs
Walkerville
BUTTE
Ramsay
Burnt Mtn
Buxton
Dickie Peak
Mt Fleecer
Mt Humbug
Janney
Donald
McQueen
Elk Park
Rampart Mtn
Sheepshead Mtn
Haystack Mtn
Mt Pisgah
Sullivan Mtn
Basin
Cliff Mtn
Thunderbolt Mtn
Bison Mtn
Old Baldy Mtn
Lava Mtn
Red Mtn
Colorado Mtn
Negro Mtn
Unionville
Jack Mtn
Little Butte
Clancy
Alhambra
Corbin
Jefferson City
Wickes
Bullock Hill
Crow Peak
Elkhorn
Giant Hill
Glendale Butte
Whitetail Peak
Ratio Mtn
Dry Mtn
Whitehall
Cardwell
Jefferson Island
London Hills
Doherty Mtn
Winston
Townsend
Toston
Lombard
Lone Mtn
Sixmile
Duck Creek Pass
Boulder Mtn
Spokane Hills
BROADWATER
JEFFERSON
SILVER BOW
BULL MOUNTAIN
CONTINENTAL DIVIDE
STANDARD PARALLEL
MERIDIAN
GUIDE
BLACKFOOT
BELT MOUNTAINS
Boulder River
Boulder Valley
Clark Fork

FIGURE 1.

from Townsend westward labelled Original Boulder-Deer Lodge Route in Figure 1 in the Record of Decision (ROD) on September 21, 1979. In response to strong public concern and objection to this route, BPA and the federal agencies prepared a supplemental EIS on the Townsend-Garrison segment, which was filed on July 14, 1981 (FEIS Supplement), with the ROD following on August 18, 1981. The ROD approved the route BPA presently intends to follow which is labelled "BPA Final Route" in Figure 1. BPA published a draft supplemental EIS for the segment of the system extending from Garrison to the Bell substation near Spokane, Washington in March 1982.

Meetings between the state, BPA and Montana Power Company were held in the spring of 1980. The state contended that BPA must comply with the MFSA for the construction of the 500 kV transmission facilities. BPA refused. During May 1980 the Governor's office requested that the U.S. Department of Energy (DOE) require BPA to comply with the MFSA. DOE responded that BPA was not subject to the MFSA. Also, the U.S. Department of Agriculture stated that the FS would not require BPA to comply with the mandatory right-of-way condition contained in the Federal Land Policy and Management Act (FLPMA) (43 U.S.C. 1765(a)), that right-of-way permittees must comply with state siting laws.

On March 3, 1981, the State of Montana sought a declaratory judgment that BPA's actions violated the MFSA and that BPA, BLM, and FS were violating FLPMA. The state also sought a writ of mandamus requiring the three federal agencies to comply with FLPMA and the MFSA. Shortly thereafter, Missoula County and several other parties filed a separate action against BPA, BLM, and FS seeking an injunction against the federal agencies to prevent construction of the proposed transmission line from Townsend, Montana to Bell, Washington.

On January 28, 1982, District Judge Battin denied Missoula County's request for a preliminary injunction on the project and concluded that "BPA need not apply for a Montana certificate of environmental compatability so long as the substantive requirements of the Montana Major Facility Siting Act are met." This conclusion followed the decision of an earlier case known as the Columbia Basin Land Protective Association v. Schlesinger, which ruled that BPA had to comply with the standards of the Washington State siting statute. Also in Columbia Basin the judge ruled that: "The BPA is not required to go through the entire certification process, but it does need to submit the information which Washington needs to determine whether the BPA has indeed met the state's substantive standards of its siting act."

On March 4, 1982, District Judge Battin granted Montana a declaratory ruling. Battin ordered that "Bonneville Power Administration must comply with the substantive requirements of the Montana Major Facility Siting Act." Also, Battin ordered BPA and the other federal agencies to submit information to the state within 30 days (of his decision) "so that the state may make a decision upon whether the state's substantive standards have been complied with." Since BPA was scheduled to begin construction on the Townsend-Garrison segment of the Colstrip transmission system in March 1982, Battin stated that this segment "must be ripe for review as to siting compliance." In accordance with Battin's decision this report addresses only the Townsend-Garrison segment. The State of Montana is presently negotiating a contract with BPA to perform the evaluation necessary for the Board to determine whether BPA's plans for construction of the line from Garrison to the western Montana border comply with the MFSA.

The determinations the Board must make in reaching its decision are listed in 75-20-301 MCA; this section requires the Board to weigh and balance all of the criteria and information required by other sections of the MFSA and siting rules. Section 75-20-503 of the MFSA lists criteria the Board is required to consider. Section 36.7.304 of the siting rules requires project sponsors to consider and evaluate a number of social, economic, engineering and environmental factors during both the construction and operation phases of their proposed facilities. Section II of this report presents a technical analysis of the information contained in the federal documents listed in Appendix A. The analysis is based on the requirements of 75-20-301 and 75-20-503 MCA and ARM 36.7.304.

BPA's original construction schedule on this project was to commence in March 1982. The schedule is based on an anticipated October 1983 completion date, which is when Colstrip Unit 3 is expected to be ready for initial operation. The schedule for this project, alternative scheduling and construction options available to BPA and the Colstrip project owners, and the economic and cost related implications of these options are discussed in Section III, along with other considerations relating to the Board's decision.

Section IV presents preliminary conclusions of this report and options for Board action.

II. TECHNICAL ANALYSIS OF SITING FACTORS

This section of the report is organized according to the social, economic, engineering and environmental factors listed in both the MFSA and the siting rules, which are of concern in analyzing the impacts created by the construction and operation of energy facilities. The information contained in the federal documents (listed in Appendix A) is evaluated in terms of the above factors. The exceptions are the factors listed in 75-20-503 MCA which are under the jurisdiction of the Board of Health and Department of Health and Environmental Sciences (DHES) and which require a determination by that agency and/or Board that it can certify the proposed transmission line. These factors include air and water quality, solid waste and radioactive substances. The evaluation and determinations of the DHES will be furnished to the Board in a separate document.

This section evaluates the alternative routes shown in Figure 1. These routes are referred to as the Helena Route, the Original Boulder-Deer Lodge Route (Original BDL Route) and the BPA Final Route. The Helena Route is identical to the route approved by the Board from Townsend to the Blossburg area west of the Continental Divide. From Blossburg to Garrison the route was generated by the federal agencies. The Original BDL Route was the preferred route selected by the federal agencies in their September 1979 Record of Decision (ROD) from all the alternatives they considered between Townsend and Garrison. The BPA Final Route was selected in the August 1981 ROD in response to public concerns and problems with the Original BDL Route.

METHODOLOGICAL CONSIDERATIONS

An environmental impact statement analyzes the possible changes and disruptions which a proposed facility can create on the natural and cultural systems which make up the environment. These systems are highly complex because individual parts depend upon and influence other parts. To assess environmental impacts (both natural and cultural) and site a transmission line, the overall method of study and route selection must be clearly defined and understandable, be based on objective analysis of societal concerns, and permit these concerns to be compared over a broad geographic area.

Summary of Federal Siting Methodology

The following summary of the methodology used by the federal agencies to compare corridor and route alternatives is adapted from the TER and from Appendix F of the Colstrip FEIS Supplement. DNRC's comments follow this description.

The federal agencies employed a four-step process to analyze and evaluate alternative transmission corridors. This process began with the identification of a number of alternative transmission line corridor segments from Colstrip to Hot Springs which came from two sources: 1) the 1973 Westinghouse Report which was included in the Colstrip Project's 1973 application to DNRC, and 2) additional alternatives generated by DNRC in its 1974 EIS to allow evaluation of possible engineering plans to connect the Colstrip lines to the existing transmission system at Great Falls and Butte-Anaconda. Step 1 consisted of an evaluation of these alternatives and elimination of those felt to be "least desirable" for each of the three engineering plans--Helena, Great Falls, and Butte/Anaconda. The objective of

step 1 was to identify the "least impact corridors" for each plan (USDI 1978, p. I-3). Step 2 involved a comparative analysis of the alternative corridors identified in step 1 (as well as the Colstrip project owners' proposed corridor and preferred alternative around the Flathead Indian Reservation). In step 3, new alternative corridors were developed to avoid areas of concern identified by the USFS and BLM and were analyzed to the same extent as were the corridors in step 2. Step 4 consisted of compiling the information generated in previous steps into the TER.

To accomplish steps 1, 2,, and 3 above, a procedure was developed by the federal study team to allow quantitative comparison of alternative corridors based on potential environmental impacts on the resources crossed. In the federal analysis, a list of major classes of environmental resources believed to have a reasonable chance of being affected by the project was developed. Each of these classes of environmental resources was referred to as a "determinant;" the list of determinants used in steps 1, 2, and 3 is shown below:

Determinants Used in the Federal Study

Determinant	Used in steps
Fish and Wildlife	1, 2, 3
Land Suitability	1, 2, 3
Surface Water	1, 2, 3
Vegetative Cover	1, 2, 3
Unique Natural Resources	1, 2, 3
Agricultural Land	1, 2, 3
Commercial Forest Land	1, 2, 3
Rangeland	1, 2, 3
Recreation Resources	1, 2, 3
Land Management Plans	1, 2, 3
Prehistoric and Historic	1, 2, 3
Human Population	1, 2, 3
Scenic Quality	1
Visual Sensitivity	1
Legal Constraints	1
Visual Resources	2, 3

In order to portray sensitivity to impact for each determinant, the federal study team specialists mapped specific resources (termed "data items") which they considered to be relevant for each determinant. For example, the "fish and wildlife" determinant was related to the geographic ranges of many different wildlife species and to the quality of the fishery in individual rivers and streams. The resource specialists developed complex numerical schemes in order to relate each determinant to the many individual data items which comprise it. The specialists also developed a system for mapping areas of "high," "medium," and "low" sensitivity to impact for each determinant based on the data items. The actual systems used varied somewhat between steps 1 and 2, but the overall approach was similar throughout the study.

The federal study team "weighted" the determinants to account for differences in importance. For example, visual resources were considered highly important by the study team, so the "visual resource" determinant was given a weight of 3, the highest possible.

In order to compare the alternative corridors, the federal study team tabulated the number of miles of each mapped data item crossed by each corridor segment. This was done by overlaying a corridor map over each data item map. These numbers (that is, miles of each data item crossed) were used to generate "impact scores" which the study team used to compare the impact sensitivity of each alternative corridor segment. For each determinant, the number of miles of high, medium, and low impact sensitivity areas crossed by an alternative corridor was calculated. The number of miles of "high" sensitivity areas crossed was then multiplied by 4, that of "medium"

by 2, and that of "low" by 1, and the results were summed to give a "data item impact score" for the corridor being measured. The data item impact score was then multiplied by the "weight" of the determinant to give a "determinant impact score." According to the TER, these determinant impact scores provided a means whereby impact sensitivity of alternative corridor segments could be compared numerically for each determinant. Finally, to arrive at a "total impact score" for an alternative corridor, the determinant impact scores for each determinant were added together.

According to the TER, "Comparing total impact scores of alternatives which could connect the same two points reveals which one would cause the more serious environmental consequences. Corridors with highest total impact scores cross the least desirable areas for introduction of transmission facilities and should be avoided in favor of corridors with lower impact scores" (USDI 1981a, p. F-3).

DNRC Comments on the Federal Methodology

The comments in this section address the process employed by the federal agencies in route selection. These comments are central to the analyses and preliminary conclusions presented in the following subsections for individual resource areas and siting concerns.

Public Involvement

As described below, the federal agencies' final decision on the BPA Final Route was not supported by the numerical impact analysis but was based largely on public concerns which were expressed near the end of the decision process. These local

concerns surfaced at public meetings held after the corridor selection and comparison phase of the federal studies. The decision was made during the centerline study to respond to public comment by widening the scope of study to consider new alternatives. This response to public comment is commendable, but it also points to an important flaw in the corridor selection methodology. No systematic attempt was made to gather public input in the initial methodological decisions, such as selection of siting determinants, data items, and weighting systems. One of the results is that decisions to change the route in response to public concerns are not quantitatively comparable to the earlier route comparisons and analysis of impacts.

Initial identification of Alternative Corridor Segments

The federal analysis relied entirely on earlier studies to identify the alternative corridor segments studied in Steps 1 and 2. These segments were adopted entirely from the alternatives originally generated by the Colstrip Project owners in their application to the Board in 1973 which were, in turn, derived from the Westinghouse study, and certain additional routes proposed by DNRC (mainly to add the Great Falls and Butte engineering plans) in its draft environmental impact statement (DNRC 1974). The Westinghouse and DNRC corridor studies did not assume a substation at Garrison as a major point of interconnection with the existing transmission system. This substation site was identified in the TER as part of the "BPA Build" alternatives (USDI 1978, p. II-58).

After steps 1 and 2 of the federal process were completed, the segment which ultimately became part of the Original Boulder-Deer Lodge Route between Townsend and Boulder appeared for the first time. This is the portion of the route extending

around the eastern edge of the Elkhorn Mountains and into the Boulder Valley. It was part of the route selected in the 1979 Record of Decision before public controversy in the Boulder Area occurred and caused still other alternatives to be identified. It is unclear how this route was identified, except for a statement that "Segment 0 (Townsend to Boulder) had been generated, in part, to avoid problem areas near Helena and Townsend. In addition, this segment would appear to offer certain definite advantages by connecting the low impact portion of the Applicant's proposed corridor with the lowest impact corridor from Step 2 analysis" (USDI 1978, p. VI-3). More detailed impact analysis in subsequent steps in the federal process indicated that this new route had lower impact than other alternatives.

The procedures used to identify the Townsend to Boulder segment are extremely important, as it appears to DNRC at this point that at least one minor alternative in this area with lower adverse impacts exists (see sections on biological and recreation concerns).

Weighting of Data Items and Determinants

The federal methodology is not explicit about the resource tradeoffs (the subjective decisions in weighting the data items and determinants) that were made to arrive at the numerical values assigned to the various alternative routes.

With an issue as complex and involving as many variables as siting a transmission line, there is no single best way to determine a route having the least environmental impact. The federal agencies employed a heavily quantitative method to compare routes, and appear to have made a good faith effort to follow it through. Unfortunately, quantitative methods which assign numerical values to

impacts do not explicitly describe the resource trade-offs that must necessarily be made. This can tend to obscure the impacts that will occur. As a result it is difficult to determine the basis for assigning the numerical values used in the quantitative analysis.

While two alternatives may differ 10 percent in their numerical impact score values, the confidence intervals around the impact scores are not known. Many of the initial resource evaluation criteria appeared defensible, but by the time the total impact ratings are reported, the data have been taken through so many calculations it is impossible to determine the actual differences between alternatives. For example, how large should the difference in impact be between routes before one alternative is clearly preferred? The federal agencies attempted to create checks and balances for the decision process (see USDI 1978, p. IV-65), but weighting schemes are subjective and modifications in them would likely alter the results, particularly given the relatively slight (total) differences among alternatives for the Townsend-Garrison area reported in the federal documents.

Relationship Between Decisions and Study Results.

The federal decision to select the BPA Final Route is not supported by the federal impact analyses, absent the public input which occurred late in the overall route selection process. However, the ultimate effect on the various siting determinants of interjecting the public input late in the process cannot be accurately determined. The route having the least indicated environmental impact was not chosen; this is acknowledged by the 1981 Record of Decision. (As used here "environment" is broadly defined to include the range of natural, cultural and social determinants.)

Table 1 lists numerical impact scores for three of the Townsend-Garrison alternatives considered in the federal studies.

Table 1.
Comparison of Corridor Alternatives from Townsend to Garrison[1]

Determinant	Helena Route	Original Boulder-Deer Lodge Route	BPA Final Route
Total Impact Score	3095	2923	3402
Total (Adjusted for paralleling)	3028	2869	-
Fish & wildlife	210	344	377
Land Suitability	340	312	357
Surface Water	164	154	179
Vegetative Cover	348	438	513
Unique Nat. Res.	39	0	10
Agriculture Lands	56	48	29
Commercial Forest Lands	57	201	272
Rangeland	94	94	99
Recreation Res.	516	306	402
Prehistoric & Historic	318	187	224
Human Population	296	201	216
Visual Resources	657	638	724

[1] Source: USDI 1978, Table VI-1 (p. VI-4a); USDI 1981b, Table 2 (p. 2-16) and Table 7 (p. 3-36).

NOTE: The data in the table are based on the assumption that the same maps and data items were used in the FEIS Supplement as were used in the TER.

This table is based entirely on numerical impact scores from the federal documents. The BPA Final Route, which was ultimately selected, ranks <u>worst</u> for 7 of the 12 determinants and is also worse in terms of total impact scores. It ranks best for only one determinant, agricultural land. Strong public concerns about

impact to agricultural land are reflected in this determinant. Based on this same table, the Original Boulder-Deer Lodge Route ranks best overall and is also best for 7 of the 12 determinants. It ranks worst for none. In arriving at a final decision on the Townsend-Garrison route, the Record of Decision indicated that the concerns of residents and landowners along the Original BDL Route -- especially visual concerns -- were given a high weight. However, according to Table 1, visual impact for the BPA Final Route was worse than that of either the Original Boulder-Deer Lodge Route or the Helena Route.

While DNRC agrees that public involvement is critically important in making siting decisions, public concerns should have been sought and incorporated systematically at the beginning of the process rather than waiting until near the end of the centerline selection process.

Dropping of Alternatives from Consideration

In its FEIS Supplement, the federal agencies examined and rejected a number of alternative routes and substation sites. In the Deer Lodge area, one of the alternatives (Alternative "B" in the FEIS supplement) was rejected because the Record of Decision said it had "A relatively high impact rating as compared to other alternatives." Yet the study indicated it had the third lowest impacts of all the alternatives, and in fact was shorter and had fewer total impacts than the route ultimately selected in that area.

The Boulder-Garrison alternative which would roughly follow a straight-line between Boulder and Garrison (USDI 1981b, pp. 1-15 and 1-16) was dismissed. Reasons listed for not considering this alternative in detail included the amount of

mountainous terrain that would be crossed (with associated icing, severe winter conditions, and construction costs), the quality of timbered land and high visibility. However, further study may have been warranted since preliminary federal studies indicated this alternative would be about 12 miles shorter than the Original BDL Route, which, in turn, was shorter than the BPA Final Route. It is not possible from available information to determine how this alternative compares to the other alternatives for the full list of determinants.

SOCIAL AND ECONOMIC FACTORS

Introduction

Transmission line siting generally arouses substantial public opposition. No one wants the line on their land or in their community. Concerns center around the visual effects (people don't want to see it), potential biological and health effects (even though, to date, research does not demonstrate harmful effects), degradation of property values, effects on land-use (particularly agricultural operations and land purchased for future subdivision), and the problems affected landowners face in negotiating a right-of-way agreement. In addition, in this case public comment shows that there is considerable public resentment towards BPA about the lack of early public notice and of public involvement in siting studies and decisions, the fact that BPA does not pay local taxes, and the manner in which BPA has approached easement negotiations.

Impacts on Population Already in the Area

A high level of public controversy has been generated by the Original BDL route. Controversy is a form of social impact in itself that affects the lifestyles of people involved in opposition activities. Conflicts between those favoring and those opposing a project may cause tension in the community and may break up relationships between neighboring landowners. Some of these impacts are likely to be long-term. BPA identified these impacts in a general way (USDI 1979a, p. 3.2-55) but did not incorporate community concerns until very late in the route selection process.

Normally community concerns are assessed during scoping meetings prior to detailed environmental studies. Then the principal concerns are systematically addressed using specified methods (such as a random sample survey) during the study, and those concerns that are relevant to the geographic location of the line are incorporated into the process used to compare alternative routes. In this project, community concerns were not assessed until after the comment period on the federal Colstrip DEIS. BPA held several public meetings in the Boulder and Deer Lodge areas from that point on, and throughout preparation of the draft and final EIS Supplements. The information used by BPA in its routing decision was that information voluntarily offered by concerned landowners and residents. While consideration of public opinion is important in siting decisions, public opinion should be assessed in a systematic way rather than relying totally on those who are most vocal or most highly organized at any given time.

The consequences of inadequate public involvement are shown by a study made recently by BPA on the long term effects on residents living under existing BPA 500 kV lines in Washington, Idaho, and Montana (MWRI 1981a). The results of the study show that lack of public involvement in the study and decision-making process caused long-term resentment in those having to live with the lines. The lack of early notification and involvement affected many residents' "perception of the entire ROW negotiation process and the project itself. These respondents' bad feelings lingered long after the line was constructed" (MWRI 1981a, p. 95). Further, insensitive handling of right-of-way (ROW) negotiations by BPA generated "substantial, lasting conflict and tension" among neighbors along the ROW (MWRI 1981a, p. 95). The possibility of additional lines being placed along the new ROW caused residents to worry that their problems might someday be compounded (MWRI 1981a, p. 96).

BPA has been using a more systematic method in the studies of the Garrison-Spokane segment of the Colstrip transmission system for determining public concerns and identifying social and economic impacts to the existing population. This has included early notification of potentially affected landowners along alternative routes, public meetings, and a survey of residents along alternative routes. While there are some methodological problems with these efforts, they allow incorporation of public and landowner concerns in corridor comparisons covering the entire study area. This was not done for the Townsend-Garrison segment.

Population Impacts due to Construction and Operation of the Facility.

No permanent increase in population is expected to result from the facility. However, both newcomers and existing residents will experience some impacts during construction.

The federal documents contained information concerning the number of local and immigrating workers for each construction "schedule" or segment and the number of family members likely to accompany immigrant workers. DNRC requested additional information indicating the number and type of workers required for each construction activity, the location of the reporting stations or substations, by month of construction, and the supply of transient lodging, school capacities, and the adequacy of services at the community level, for those communities within a reasonable commute of construction reporting stations. These communities include Townsend, Boulder, Helena and Deer Lodge.

The information subsequently provided by BPA (Frick 1982) indicates that the three construction sections will be as follows: Schedule I - Townsend-Boulder; Schedule II - Boulder to Black Mountain; and Schedule III - Black Mountain to Garrison. BPA's current construction schedule calls for Schedule I activities to begin May 17, 1982; Schedule II - April 30, 1982; and Schedule III - August 30, 1982. Workers required under the three schedules would primarily be non-local. Schedule I would call for a maximum of 32 non-local workers entering the Townsend area; a similar number would be based in Boulder. Schedule II would call for a maximum of 46 non-local workers in Boulder, and 19 in Helena. Schedule III would call for a maximum of 65 in the Deer Lodge area. In addition, substation construction would require a maximum of 33 non-local workers in Deer Lodge. Table 2 shows numbers and kinds, in proportion, of a typical schedule work force. Table 3 shows the maximum worker and school-age children impact in each community.

Table 2
Construction Labor Requirements by Skill

Task	Crew Size	Skills Required: Skill	Number
Clearing	40	Grader operator	1
		Oilers	5
		Cat operator	7
		Truck driver	5
		Loader operator	1
		Backhoe operator	1
		Skidder operator	2
		Mechanic	1
		Faller	7
		Bucker	4
		Choker setter	4
		Fire watcher	2
Footings	10	Transit worker	1
		Equipment operator	1
		Oiler	1
		Chainman	2
		Laborer	4
		Foreman	1
Assembly	12	Assemblyman	8
		Equipment operator	2
		Oiler	1
		Foreman	1
Erection	8	Groundman	2
		Lineman	3
		Equipment operator	1
		Oiler	1
		Foreman	1
Conductors	10	Lineman	4
		Groundman	2
		Equipment operator	2
		Oilers	2
		Foreman	1
Supervision	3	Supervisor	1
		Office worker	1
		Mechanic	1

Source: Frick 1982.

Table 3
Community Impact

	Townsend		Boulder		Helena		Deer Lodge	
	Max No. workers	Max No. school children	Max No. workers	Max No. school children	Max No. workers	Max No. school children	Max No. workers	Max No. school child-ren
Schedule I	32	12	32	12				
Schedule II			46	17	19	7		
Schedule III							65	24
Substation							33	12
Total Maximum Community Impact	32	12	78	29	19	7	98	36

Source: Frick 1982.

The schools in all four communities have adequate capacity to handle the expected influx of students (Frick 1982). However, the demand for transient lodging (motels and recreational vehicle hookups) created by tourists and the incoming construction workers may exceed the number of units available in Deer Lodge. DNRC is further exploring this possible shortfall and options which may be available to offset it. The other three communities appear to have adequate transient lodging capacity.

Projected Changes in Social Structure

Information concerning changes in social structure is general rather than community-specific (USDI 1979a, p. 3.2-55 to 57; USDI 1978, VII-93)), but it is adequate. Short-term population growth during construction could have considerable influence in small communities on permanent residents as well as immigrants. According to the federal studies, long-term social structure changes would be

expected where public opposition and associated activities significantly change peoples' lifestyles or where conflict between proponents and opponents of the project "disrupt community cohesiveness" (USDI 1978, p. VII-93).

Taxation

The public issue of taxation has revolved around the difference in taxes local governments would receive if the Townsend-Garrison transmission lines were to be built by a private company rather than the BPA. Public comment reveals that acceptability of the lines depends in part upon a monetary benefit to the community. Under existing law BPA cannot pay taxes to local governments, and this conclusion would not change with different routing alternatives.

There is a provision in the Pacific Northwest Electric Power Planning and Conservation Act for BPA to make "impact aid payments" for impacts on local government services. However, the method for computing such payments has not yet been determined and will not be authorized until the first fiscal year following adoption of the Regional Plan. In the FEIS Supplement, BPA suggests that impact aid would be given to help build a new facility such as a road or school, if such a facility were required "as a direct consequence of a BPA action. BPA does not foresee the need for such local government expenditures as a consequence of this project." (USDI 1981b, p. 6-72). Based on the information provided by BPA, DNRC agrees that the number of construction workers associated with this project will not trigger the need for such expenditures.

The principal impact on the local private economy is the effect on agriculture, which is discussed under land use. Both acres and value of irrigated and dryfarm land were considered in making corridor comparisons.

Local and Government Spending

The only impacts on local government services from the Townsend-Garrison transmission line would be during the construction period; there would be no long-term impacts on local government services. The draft EIS concluded that construction period impacts to housing and local services would be greatest in rural areas such as encountered along the Townsend-Garrison alternative. The data on housing supply and services provided by BPA (Frick 1982) indicate that the impacts along this route will be minimal.

Construction and Operational Costs

Construction and operation costs of the facility are included in the federal documents (USDI 1978; p. II-50, USDI 1979d; USDI 1981b, Table 4).

HEALTH AND SAFETY ISSUES

Introduction

Potential electrical and biological effects of high-voltage power lines have been an important issue on a number of transmission projects recently. The issues include production of ozone and nitrogen oxides, noise, and electromagnetic interference with radio and TV; electrical discharge from objects such as trees that are close to lines; electric shocks from spark discharges; exposure to steady electrical currents from, for example, metal objects under the line such as fences; and generally suspected but unspecified low level biological effects.

Issue Analysis

Health and safety issues were considered by BPA in establishing a right-of-way width of 125 feet: "Right-of-way width was established after consideration of conductor 'blow-out' (lateral movement of conductors due to wind), minimizing electrical field strength, and audible noise and radio frequency interference....Land for the right-of-way would be acquired by easement. Landowners may continue certain uses of land under the lines, but precautions would be necessary" (USDI 1981b, p. A-1). These are primarily health and safety issues which are "direct", fairly well understood scientifically, and often in the category of common electrical dangers, such as electrical currents inducted in metal objects. They are also the basis for the restrictions of human activities that are commonly observed under and near lines of this size. Potential indirect effects relating to chronic exposure to electrical fields are not as well understood and are discussed further below.

There is no fixed right-of-way width for lines of this voltage, but BPA uses a relatively narrow, right-of-way (Shah 1974; Durfee 1982; Herrold 1979). Right-of-way width, besides being a legal concept, is: 1) a measure of where precautions should be taken or restrictions should be placed on human activities next to and under high-voltage lines to protect health and safety, and 2) a measure of what BPA regards as the impact zone with respect to noise, and human health and safety. This way of thinking of right-of-way width would be appropriate for areas where people live, or may live, during the life of the line.

The FEIS Supplement (Appendix C) contains a comprehensive statement of BPA's views on potential impacts caused by each of the issues mentioned above, and also summaries of research findings regarding these impacts. This data is the same as that currently in DNRC files, and indicates that there is little or no evidence of low-level biological effects extending outside of rights-of-way of lines of similar size. While there are generally recognized biological effects (e.g., effects on honeybee hives) that can occur at electrical field levels that are projected to occur directly <u>under</u> the line, there are very few studies that lead to any suspicions that human health effects will be demonstrated in the future at the electrical field levels that would occur at the edge of the right-of-way. There has been a large amount of research on the subject, and much is ongoing. As noted, by the BPA, however, this does not prove "zero risk"(USDI 1981b, p. C-7).

Problems with radio and TV interference can be mitigated effectively; BPA has stated that such mitigation will be done.

Based on a literature review of indirect effects on human health from electrical fields, some concern is indicated about the narrowness of BPA's 125-foot right-of-way (see section on noise impacts). While there is little or no direct evidence of damage to human health from electrical fields near the line, there is some indirect evidence of effects, indications of a small element of risk, and enough uncertainty in the research findings to indicate that it would be prudent to avoid constructing the line close to human dwellings or places where people work each day. The only governmental mechanism for preventing this is by adjusting the right-of-way width to prohibit it. This issue is most significant in urban areas.

NOISE IMPACTS

Noise impacts would be caused by equipment operation during construction and by corona discharge noise production from the conductors.

Equipment noise, and noise caused by other human activity during construction would be temporary and would affect few people because of the rural character of most of the corridors. In some cases the noise might disturb wildlife at critical times, but this issue has been addressed and should be partly mitigated by timing construction to avoid critical periods for wildlife.

Corona discharge from transmission lines produces a faint hissing or crackling noise during dry weather, and a more intense sizzling noise during wet weather. This noise production has been an issue in siting power lines, and is a determinant in choosing right-of-way widths (USDI 1981b, p. A-1). While Montana does not have noise standards, line noise nevertheless degrades the environment near the line and is a concern of people living nearby.

BPA has stated that audible noise production was a factor in establishing a right of way width of 125 feet, but there apparently are conflicting estimates of noise levels at the right-of-way boundary in BPA's FEIS Supplement. Appendix A, Facility Description, estimates a level of 51 dBA 62.5 feet from the centerline (at the edge of the 125 foot right-of-way) during foul weather. Table C-1 in Appendix C gives an estimate of 51 dBA 50 feet outside the outer conductor during rainy weather, or, according to the tower description in Appendix A, about 75 feet from the centerline (the edge of a 150 ft. right-of-way.).

BPA has clarified this estimate in recent communications with DNRC staff. The 51 dBA estimate has an error factor of plus or minus 2 dBA (Frick 1982). Also corona noise attenuates (fades away) slowly as one moves away from the line source (Eddy 1982). Thus, if the measurement error is considered, both right-of-way figures, 125 and 150 feet for a 51 dBA noise level, are correct.

The BPA states that these levels are within noise limits identified in EPA guidelines (USDI 1981b, p. C-2). However, these guidelines concern general noise impacts to public health and welfare in residential areas where background noise is already elevated and do not concern nuisance or annoyance noise impacts to isolated residences in rural areas.

Golden et al. (1979, p. 510) states that a 50 dBA noise level will potentially cause "moderate sleep interference," and a level of 55 dBA will cause "annoyance (mild)." BPA has stated that noise limits from the line will be "within prescribed limits" (Frick 1982). This limit is 53 dBA, and is based on BPA studies done in 1971 (Eddy 1982). However, it seems likely there will be potential noise impacts outside the 125-foot right-of-way, if the error factor in BPA's 51 dBA estimate is considered, the slow attenuation of line noise is accounted for, and if the Golden et al. (1979) estimate of noise impact is accepted.

While DNRC identified the aforementioned general noise impacts, the BPA discussion of noise impacts leaves unresolved the following three issues: (1) the issue of impacts to present and future land uses next to the 125-foot right-of-way from nuisance or annoyance noise levels, (2) what right-of-way width should be considered appropriate in areas where people are now living, or may want to live in the future, and (3) the lack of a description of what measures BPA would take if there are audible noise complaints after the line is built.

These issues would be most important in any present-day urban areas crossed by the line, but also would affect isolated residences located near the line and would affect future land uses immediately adjacent to the right-of-way. These issues would not be of concern in other areas. The special circumstances that would be necessary for the impact to occur--human habitation next to the right-of-way and wet weather--are not sufficiently serious to indicate a modification of BPA's design or of the right-of-way width for the Townsend-Garrison segment. However, BPA should be required to adequately deal with noise complaints after the line is built.

CULTURAL FACTORS

LAND USE CONCERNS

Introduction

Transmission lines represent a long-term land use commitment, and may not only disrupt existing uses -- industrial, agricultural and forestry operations, recreational use of public lands, residential land use, and specialized uses such as resorts and airports -- but can impose a long-term restriction on possible future land uses, particularly sprinkler irrigation, residential development, and timber production.

Consistency of transmission line facilities with adopted federal, state, and local land use plans must be addressed in impact analysis, since transmission lines are essentially a permanent land use which may be incompatible with long-term plans for orderly land development, land management, or land use.

Formally adopted federal and local land use plans were adequately treated, including federal specially managed areas, USFS planning unit objectives and county and city-county land use plans (USDI 1978, pp. III-71, III-87).

Area of Land Required and Ultimate Use

The federal documents describe land requirements for the right-of-way, access roads, staging and storage areas, and substations (USDI 1978, pp. II-22-II-38; USDI 1981b, Appendix A). Land areas necessary for tower assembly and installation of counterpoise are not adequately addressed, especially as they relate to land disturbances outside the nominal 125 ft right-of-way.

Existing and Projected or Alternative Land Uses

The following shortcomings were identified in the discussion of existing and projected land use.

It is not clear whether potential and planned future irrigation was mapped during the federal studies. Also it is not clear whether land that has been platted for residential development was considered. This would have been desirable for corridor comparison. Although most, if not all, such areas can be avoided during centerline selection, if they are not considered at the corridor selection stage, this can escalate public concern and potentially limit centerline options.

Treatment of agricultural land uses overshadowed that of other land uses in both the data inventory and impact analysis. It is likely that impacts on cropland received more emphasis than they ordinarily would have, due at least in part to the public concerns triggered by BPA's siting process. The weighting given to agricultural land as a result of these concerns is not quantitatively comparable to the earlier study results (see discussions of methodology and social factors). BPA also may not have factored in the extent of possible mitigation of net impacts to cropland that could have been accomplished by careful placement of towers and/or modification of existing irrigation systems.

For example, one of the major reasons for the Boulder area reroute (the BPA Final Route) was the fact that the Original BDL Route crossed 1.7 miles of irrigated land in the Boulder Valley (USDI 1981b, Table 1). However, it is possible that a centerline could have been found which actually crossed less irrigated cropland and did not interfere with irrigation systems. This cannot be determined from available data. Second, the amount of land actually taken out of production by the tower bases is small, amounting to about 0.15 acres of irrigated cropland (USDI 1978, p. VII-100). Finally, interference with existing irrigation systems, if any, could possibly be mitigated by careful placement of towers and/or modification of existing irrigation systems so that there would be little or no net loss of irrigated acreage (Varner and Patel 1982; Henderson and Scott 1981; and Malefyt 1981). At worst, the TER estimates crop value loss for the entire Original BDL Route to be on the order of $750-$1500/yr (USDI 1978, p. VII-58). In comparison, line losses of electricity for the BPA Final Route are about $700,000 greater over the life of the facility than those of the Original BDL Route, and construction costs would be about $900,000 greater (USDI 1981b, Table 4). A yearly cost was not given for line losses.

The route adjustments to avoid agricultural land in response to public concerns increased the line's impacts on other land use categories (Forestry, Rangeland); the BPA Final Route ranked worst for these two categories according to the numerical rankings reported in the TER and FEIS Supplement (see Table 1 of this report).

HISTORIC AND ARCHAEOLOGIC CONCERNS

Introduction

Historical and archaeological sites are valued as a reflection of our cultural heritage, and they serve as a sense of pride and orientation for people.

Impacts might include but are not limited to: 1) destruction or alteration of all or part of a historical or archaeological site; 2) introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting; 3) isolation from or alteration of a property's surrounding environment; 4) or loss of scientific, historic and prehistoric information that could provide a better understanding of our past.

Impact Analysis

The federal documents do not identify impacts to specific historic, architectural, archaeological, and cultural areas and features. Instead, each of the documents include statements that BPA will comply with the Historic Preservation Act (16 USC 470) and will consult with the Advisory Council on Historic Preservation (36 CFR 800) regarding impacts and mitigation or avoidance measures (USDI 1982, p. ii). Normally compliance with this Act and federal regulations would result in full

identification of sites, evaluation of their significance, determination of impacts, and appropriate avoidance or mitigation measures. This would satisfy the requirements of MFSA. As a part of its construction guidelines for the Colstrip to Townsend portion of the line, the Board required this same compliance.

For the BPA Final Route the State Historic Preservation Office (SHPO) reports that compliance procedures are being followed but are not yet complete (Sherfy 1982). If construction begins this spring, there may not be sufficient time to complete these compliance procedures.

BPA evaluated the alternative routes by comparing lists of archaeological and historical sites identified as of 1974 and 1978. The list of known sites for the BPA Final Route was updated in 1981 (Choquette et al. 1981), and a centerline survey performed the same year (Mierendorf et al 1982). Since the potential impacts of the various alternatives were not evaluated with the same intensity, it is not possible to compare them to determine the least impact alternative. However, it should be noted that detailed surveys and compliance procedures are normally performed only for the route where construction will actually occur. The Federal study of alternative routes concluded that the Helena Route would involve much greater impact to cultural resources, but the basis for this conclusion is not evident from available data.

RECREATION CONCERNS

Introduction

The TER discussion of recreation impacts adequately describes the types of impacts transmission lines can have on recreation: loss of existing and potential land and water-based developed recreation settings (such as picnic areas, parks, and campgrounds); loss or displacement of existing and potential dispersed (undeveloped) recreation opportunities (such as backpacking, cross-country skiing, and snowmobiling); reduction in the quality of existing and potential recreation experiences; increase in access to recreation settings resulting from building new roads or improving existing ones; and two economic impacts--reduction in both recreational land values and income from tourism (USDI 1978, p. VII-65). Because appreciation of scenic beauty is an important component of outdoor recreation, there is overlap between this section and the following section on visual concerns.

Impact Analysis

While information on recreation resources existing in the study area was generally adequate, more detail would have been desirable concerning the use levels and patterns at specific recreation settings. Little was said about the relative importance of the recreation settings discussed. Although the impacts of crossing a highway or river may be greater at one place than at another, all were reported in terms of "miles of impacts."

The criteria listed on the "Recreation Suitability Evaluation Form" contained in the TER were adequate (USDI 1978, p. A-3). The general discussion of potential generic recreation impacts was also adequate, although the impacts of increased recreational access (new or improved roads) could have been addressed more comprehensively (USDI 1978, p. VII-65).

The main problem is that the criteria and the discussion of impacts from the TER were not fully used in the documents which came later. The DEIS and FEIS Supplements reported fairly substantial differences in recreation impacts among the route alternatives. However, in these documents, recreation is explicitly evaluated in some corridor comparison tables (e.g., see USDI 1981a, Table 4) but is dropped as a "major environmental consideration" in other tables (e.g., see USDI 1981a, Table 5).

The treatment of recreation impacts is adequate, however, because of the overlap among recreation and other determinants, such as fish and wildlife, visuals, unique natural resources, and historic resources; all of these contain recreational components, and because they were separate determinants, recreation was probably not short-changed. According to the federal analyses, the BPA Final Route would have less impact to recreation than the Helena Route, but greater impact than the Original BDL Route.

VISUAL CONCERNS

Introduction

Over the past decade or so, transmission line siting has become more controversial. Greater concern for protecting the visual character of the landscape is often at the root of this new-found controversy; electrical transmission lines are often viewed as out-of-place with the existing visual character of the landscape. The emotional reactions brought on by the sight of a transmission line is its visual impact. These impacts are often difficult to explain or quantify because a transmission line may not produce the same kind or degree of impact on two different persons, or even on one person at two different times. But although visual impact assessment is subject to differences in approach and interpretation, it is a major concern.

The TER discussion of visual impacts adequately describes the types of impacts transmission lines can have on visual resources and aesthetics (USDI 1978, p. III-110). The visual impacts of transmission towers and rights-of-way vary with several factors: the character of the landscape and vegetation; its ability to absorb visual impacts; scenic quality; right-of-way width; type and height of tower; and the viewers themselves -- their level of concern and expectations for scenic quality, as well as the number of viewers, duration of viewing, and location of viewpoints.

Impact Analysis

The TER reported that the visual information used to identify initial route segments (in Step 1) was inadequate. A consultant was subsequently hired to address this concern. From this point on, the visual information used was adequate; visual resource management class and contrast ratings were both used to determine visual impacts. However, the earlier analyses were not recomputed using the updated information base. This leaves a question as to whether (from a visual perspective) the best initial route segments were chosen, especially considering the high weightings given to visual resources.

The subsequent visual impacts analysis seemed both accurate and adequate; appropriate criteria were used to estimate impacts, and visual resources were given maximum weight (3), reflecting concern for scenic beauty. The TER (USDI 1978, p. IX-17) stated that "The project would, nevertheless, under the best of conditions, produce substantial unavoidable visual impacts."

A problem was that scenic or visual impacts to historic properties were not evaluated on the same scale as general scenic impacts. Inventory of sites of historic or archaeological significance was generally limited to the 125 ft right-of-way; therefore, visual impacts to sites which would be outside the right-of-way but within the line of sight (of the right-of-way) were not addressed. Choquette et al. (1981) identified 37 known historic sites within one-half mile of the proposed right-of-way. BPA should consult with the State Historic Preservation Office for a determination of magnitude and significance of the visual impacts to these sites. Appropriate mitigation measures recommended by SHPO should be implemented during the centerline process.

The 1981 Record of Decision (ROD) which selected the BPA Final Route appears to negate the adequacy of the visuals analyses by choosing a route higher in visual (and other) impacts than the alternatives (see Table 1 of this report). It is unclear, however, whether the problem is the intricate methodology used to compare routes, or federal agency misinterpretation of the results (see methodology discussion). For example, the 1981 ROD stated that "Visual impacts will be mitigated by use of the Boulder Corridor," (USDI 1981c) (the BPA Final Route) despite the fact that the Original BDL Route had a lower score on visual impacts than the BPA Final Route. The Decision said that local resident concern for visual impacts was a consideration, and the BPA Final Route, along the foothills, would have fewer impacts than the Original BDL Route, which crosses the valley center. If this was an important concern, it should have shown up in the visual impact numerical ratings. This may reflect the lack of public input in initial decisions of determinants, weighting schemes, and data items, a weakness of the methodology.

A similar contradiction was evident in choosing the Black Mountain AAA segment (near the Deer Lodge end of the BPA Final Route). The 1981 ROD said that the "Visual impact TER rating is higher for Black Mountain AAA," but that this route could "Better absorb the visual impact." The landscape's ability to absorb alterations without losing its visual quality, however, had already been considered in impact rating and route selection.

Based on the results of the federal agencies' impact analyses and corridor ranking, visual resources received generally contradictory treatment in the route decision. According to the federal numerical rankings, the Original BDL Route was slightly superior visually to the Helena Route, but again, given the considerations

to agricultural land use, the BPA Final Route was selected; for visual impacts, this route was worse than either the Helena or Original BDL Route.

ENVIRONMENTAL FACTORS

EARTH SCIENCE CONCERNS

Introduction

The building and operation of transmission lines involve road construction, foundation work, and other activities which affect or are affected by geologic conditions. Geology in its broadest sense includes soil and hydrology. Long-term reliability of a transmission line depends, in part, upon reducing risk from landslides, flooding, and other geologic processes, but altering the landscape can also induce secondary impacts of a geologic nature upon other resources. For instance, severe erosion and small scale landsliding associated with access roads affect vegetation, may pollute streams, and alter the visual character of an area. Understanding of the soil and bedrock characteristics can enable planners to avoid particularly sensitive areas or to take precautions to mitigate the hazards.

Climatic conditions may affect line reliability, vegetation recovery, and geologic processes such as landslides. Climate varies across Montana, particularly with elevation and proximity to mountain masses.

CLIMATE

Much general information concerning the climate is provided in the Colstrip documents, most of which is irrelevant to the siting of the line (USDI 1978, p. III-3-7, VII-1; USDI 1979a, p. 3.1-2, 3.2-4; USDI 1981b, ch. 2,3). Aspects of the climate which have a bearing upon siting and impact analysis change mostly with elevation. This is discussed in the various documents. Icing, which could cause line breakage, is, according to the documents, greater at higher elevations, especially along the Continental Divide; however, few meteorological data have been obtained in the mountains and statements concerning the effects on a transmission line at higher elevations are based on professional judgement.

GEOLOGY

Bedrock geology is discussed in very general terms (USDI 1978, p. III-9, VII-3-6; USDI 1979a, p. 3.1-3, 3.2-7; USDI 1981b, ch. 2-3). Transmission lines can be built over nearly any geologic terrane if the local physical properties are known and taken into account in the design. Since the geologic patterns change so greatly over short distances, many of the geologic considerations come to bear only during centerline evaluation.

Some special geologic concerns were addressed in greater detail, including landslide hazards (USDI 1978, Figure III-3). The accuracy of the information and its relevance to transmission lines has not been determined (i.e., the individual landslides might be spanned or the line might not initiate activity).

Seismic risk has been addressed, but more from the view of what the line will do to seismicity instead of the other way around (USDI 1978, p. III-11). Transmission lines are not particularly susceptible to earthquakes and no damage to the line would be expected except in rather large quakes; therefore, the topic is probably adquately covered.

Potential interference with mining and impacts created by access road construction have been included in the discussions of geology and geologic impacts. Impacts on soil erosion, soil compaction, and soil mass movement (landslides) were treated in corridor selection. How accurate the evaluations are has not been determined, but the treatment appears to be adequate.

WATER RESOURCES

Water resources are most affected by soil erosion and stream bed disturbance which introduce sediment to the water. The amount of road construction necessary for access, the management of access roads and the right-of-way, and the care used in construction, in addition to the suitability of the land, all affect the amount of impact. Land suitability, in terms of water resource impacts, is indistinguishable from geologic impacts which have been fairly well treated. Other possible water resource impacts may include temperature changes from vegetation clearing, herbicide pollution, increased sedimentation, and water yield changes. These impacts, which are most likely to occur in forested areas, were adequately discussed.

The impacts on stream flow and other water users are insignificant. Even crossing floodplains can be done so as to minimize risk to the line during floods and alteration of the natural flood flows.

The identification and treatment of wetlands indicates very small areas, such as on floodplains and mountain marshes, were not considered in the TER and Colstrip DEIS. Severe damage can be done to these small, isolated environments. Their smallness in size should not be interpreted as smallness in value. The diversity added to the landscape, wildlife and scientific value contributed by minute wetlands is considerable (Brant 1980). Although some small wetlands can be avoided in centerline selection, many are closely spaced and hydrologically connected making it difficult, if not impossible, to eliminate major impacts if a group lies within the corridor.

The effects on aquatic life, which are anticipated to be minor overall, were dealt with in sufficient detail. No water resource monitoring programs were discussed or proposed. Given the threat of significant impact from erosion along the right-of-way and associated access roads, a suggested monitoring scheme would have been helpful.

From the data provided it appears that none of the alternate corridors from Townsend to Garrison are particularly advantageous considering only geologic factors. Soil erosion would likely be the greatest impact, especially in some areas. Icing of the lines can be a problem in the higher elevations associated with any of the Townsend-Garrison route alternatives. Small scale problem areas exist in all the corridors but can usually be dealt with in centerline location.

BIOLOGICAL CONCERNS

Introduction

This section concerns natural systems and plant and animal life. Some of the most important impacts that transmission lines may have on wildlife include: habitat disturbance such as removal of vegetation which serves a critical purpose in an animal's life; fragmenting of habitats which can lower the overall population of a species which needs large areas of continuous habitat; disturbance resulting from increased human activity as a result of construction and the building of new access roads; and increased risk of wire strikes by waterfowl near wetlands. Fish and other aquatic organisms can be affected by construction-related sediment input into streams and other water bodies.

Transmission lines cause impacts to vegetation due to clearing of rights-of-way. These are of special importance in forested land where regrowth of trees is suppressed.

Rare and endangered plant species can be affected by transmission lines. However, according to the TER, no federally-listed plant species are known to occur within any of the alternative routes (USDI 1978, p. IV-27).

Impact Analysis

Information concerning plant and animal life was generally accurate and comprehensive (see USDI 1978, pp. III-26, 63; VII-22,51).

The model used to determine potential impacts to these concerns appears to adequately reflect impact risk, despite some methodological problems discussed earlier. As with other determinants, the model's intricacies made it difficult to determine how correct the conclusions were (see methodology discussion). In the vegetative cover determinant it appears that impacts to rangeland were overrated and timber land underrated. According to the TER (USDI 1978, p. IV-45), actual impacts to rangeland would be minimal. In contrast, impacts to forest cover would be many times more serious and long-lasting. An important drawback of the wildlife impact model is its apparent lack of consideration of existing disturbances (roads, powerlines, etc.) and the desirability of siting the line in or near such disturbed areas to minimize wildlife impact risk.

One biological impact issue was not resolved to the satisfaction of DNRC. BPA's proposed transmission line crossing of the Missouri River near Townsend would involve clearing of mature cottonwoods used as perch trees by bald eagles, would pass near two recently active osprey nests and a great blue heron colony, and would cross near a waterfowl wintering area along a warm water slough where the likelihood of wire strikes is high. DNRC believes that potential wildlife impacts could be mitigated by moving the river crossing approximately one mile south, where there are no mature cottonwood trees, without increasing the damage to cropland. This issue was brought to the attention of the study team by the U.S. Fish & Wildlife Service (BPA 1981a), the Department of Fish, Wildlife and Parks, and DNRC. The alternate crossing was rejected by BPA because it was said to cross more irrigated land and "would not allow retention of any more riparian habitat" (DOE 1982, p. IV-5). This statement does not accurately describe the situation. A possible reason for not adjusting the crossing is that the alternate crossing lies outside the federally approved corridor.

Once the environmental assessments were completed, BPA selected the route having the highest risk of impact to fish and wildlife (see Table 1 of this report). As stated in the Mitigation Report (DOE 1982, p. VIII-2), "BPA and USFS will share costs of a study of elk in the Berkin Flat area." This study, if properly designed, could provide the data to develop a plan to mitigate some of the adverse impacts of the project on wildlife.

Given that the BPA Final Route ranked worse than the Original BDL or Helena routes, wildlife impact was apparently not a major factor in corridor selection.

ENGINEERING FACTORS

Introduction

Major engineering considerations that are of concern in making siting decisions include: cost, location, design, scheduling, system reliability, system losses, paralleling advantages, construction problems, and future system changes.

Overall, DNRC has presented its analysis of these considerations in considerably more detail in its public documents (the Anaconda-Hamilton and Troy-Mt. Vernon EIS's, for example) than have the federal agencies for the Colstrip project. Federal treatment is cursory regarding service alternatives as related to cost, load flows, possible future taps of the line, other future changes or additions that could reasonably be proposed for the regional transmission system, and the advantages and disadvantages of paralleling existing lines or other linear facilities.

In general, regarding these major engineering considerations, the federal approach has been to justify its preferred designs, rather than compare and weigh all reasonable alternatives in the published documents. However, since the major system design components and need for the project have been established, the federal analyses are generally adequate.

The following topics received little or no treatment, but they are adequately covered, primarily because they are only marginally or not applicable to the present analysis:

1) surge impedance loading and switching surges (discussed briefly in the FEIS Supplement (USDI 1981b, Appendix A) and TER (USDI 1978, p. II-11)); 2) theoretical voltage gradient in kV/cm and as a percentage of critical voltage gradient on the line (not discussed for the double-circuit design); 3) equivalent phase spacing (not discussed for the double-circuit design); 4) tower heights; and 5) line losses.

According to the FEIS Supplement, the tower height for the Townsend-Garrison segment is approximately 162 feet, +-, but no height range is given. However, the validity of the analysis of visual impacts in the TER would not be affected because this analysis uses the results from another previous study that evaluated the visual impacts of towers 176 feet high.

The topic of undergrounding the line, rather than constructing it overhead on towers is discussed in general terms in the TER and Colstrip DEIS (USDI 1978, p. II-13; USDI 1979a, p. 3.7-10).

The following engineering issues are discussed further in the sections of this report concerning social factors and noise impacts: 1) right-of-way width; 2) construction schedule and construction sequence; 3) construction crew sizes; 4) corona loss; and 5) noise.

Only one circuit of the 500 kV double circuit line is needed to provide adequate transmission capacity for Colstrip Units 3 and 4. The second circuit is designed to provide reliability. The FEIS Supplement (USDI 1981b, p. A-2) states that the "capacity of the line would be about ..... 1,400 MW." However, the Colstrip DEIS (USDI 1979a, Table 3.7-3) presents the information that 500 kV "high capacity" double-circuit lines have a transmission capacity of 5,000 MW and that a 500 kV single circuit line has a capacity of 1,500 MW.

In recent communications to DNRC, BPA has clarified that 5000 MW capacity is a "typical" value for a 500 kV double circuit line (Frick 1982). For reliable service, each circuit of the 500 kV double circuit Townsend-Garrison line is designed to transmit the full output of Colstrip Units 3 and 4, or 1400 MW. The planned series compensation (series capacitors), which have been designed for a 1400 MW capacity in each circuit, are the limiting factor in the 1400 MW power transfer. The line itself is capable of transmitting more power, but the series capacitors would have to be uprated to accomplish this (Frick 1982).

III ADDITIONAL IMPACT CONSIDERATIONS

The Board must take into consideration the potential economic costs to the rate payers of Montana and the Pacific Northwest if Colstrip Unit 3 power cannot be transmitted by its currently anticipated October 1983 operational date and January 1984 commercial date. A further consideration is the difference between the environmental, social and economic impacts associated with the BPA Final Route, and the comparative impacts associated with any other alternative route. This consideration must include the social impacts that might occur as a result of public opposition to the BPA Final Route, or to a new route if the Board determines that BPA's route does not comply with the substantive standards of the MFSA.

The preceding section of this report evaluates the comparative impacts associated with alternative routes. This section analyzes the economic costs of delaying construction of the transmission line, the scheduling situation associated with Colstrip Unit 3 and the transmission line, and additional impact considerations.

DNRC requested BPA to provide economic and scheduling information necessary to prepare this analysis. In turn BPA asked MPC to provide part of the information. The letters containing DNRC's request and the responses provided by BPA and MPC are presented in Appendices B, C and D.

Schedule Considerations

As currently planned, construction on the Townsend-Garrison line is scheduled to begin in April, 1982, and be completed in October 1983. Two construction seasons are planned as shown in Figure 2. Startup at Colstrip 3 would take place as soon as the line is completed, followed by three months for testing and shakedown; commercial operation is scheduled to start on January 1, 1984. MPC has indicated that if the line is not ready, testing of Unit 3 cannot start because there is not sufficient capacity in their transmission system, even with the Colstrip 500 kV line to the Broadview substation, to accept the additional 700 MW of power. Some testing of the plant might be possible if Units 1 and 2 could be shifted in and out (i.e., taken down and started back up) but the 3 month period for shakedown could not be greatly reduced. This would imply that a one month delay in completion of the transmission lines up to and including the Garrison substation is roughly equivalent to a one month delay in commercial operation.

The relationship between a delay in starting construction of the transmission lines and the time of completion is not clear. BPA indicates the current schedule is extremely tight and there are no significant possibilities for shortening the schedule (see Appendix B). DNRC was unable to identify any measures which would be effective in significantly reducing the construction schedule, other than possibly adding more and smaller segments to the construction plan, for example having six, or nine simultaneous construction spreads instead of the three that are planned. BPA does not believe that this could be done effectively. If the schedule cannot be shortened, or if a delay in the starting date pushes construction activities into the winter season of late 1983, there is the possibility that completion might be delayed until the spring of 1984, with commercial operation of Colstrip 3 then delayed until the summer of 1984.

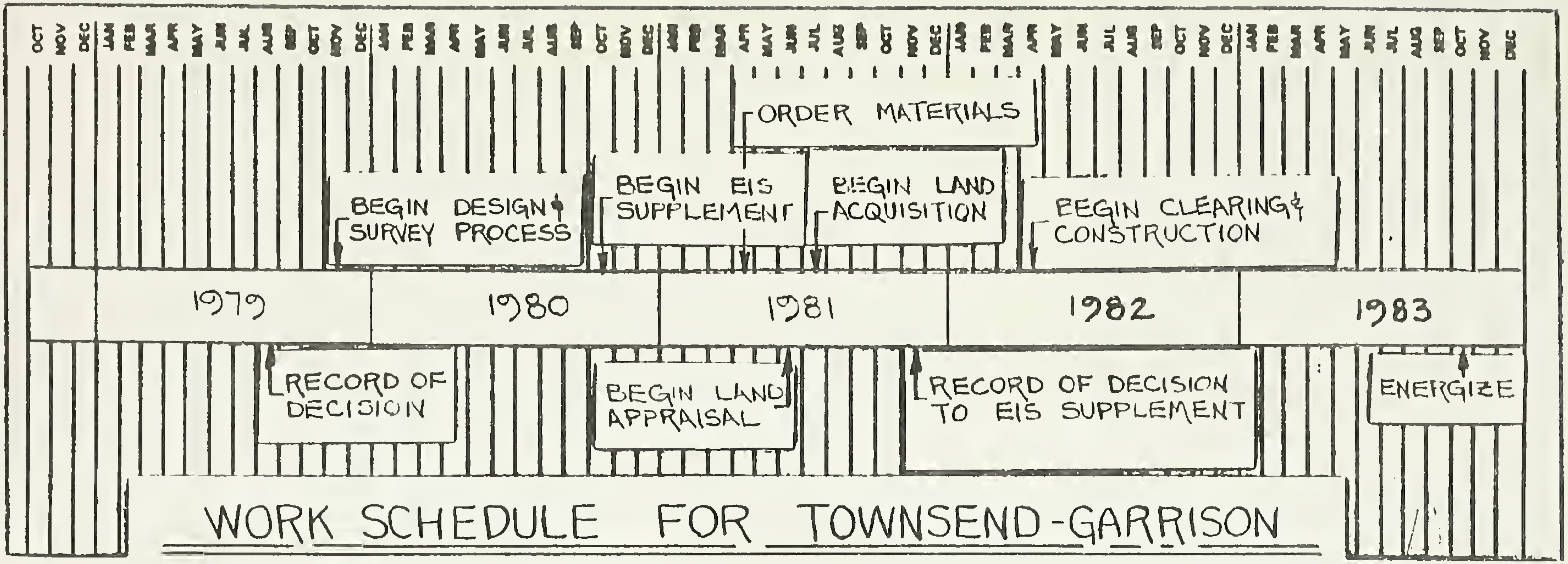

ORDER MATERIALS
BEGIN DESIGN & SURVEY PROCESS
BEGIN EIS SUPPLEMENT
BEGIN LAND ACQUISITION
BEGIN CLEARING & CONSTRUCTION
1979
1980
1981
1982
1983
RECORD OF DECISION
BEGIN LAND APPRAISAL
RECORD OF DECISION TO EIS SUPPLEMENT
ENERGIZE
WORK SCHEDULE FOR TOWNSEND-GARRISON

FIGURE 2.

BPA has stated that if it were to construct the line on any route other than the BPA Final Route, Federal Register Notice and filing of a new Record of Decision would be required, followed by approximately a 2-year period for survey, design, material changes, and right-of-way acquisition before construction could start. BPA does not clarify this statement, but presumably is referring to the time and activities that would be required to prepare to construct the line on an entirely new route rather than minor modifications to the existing route. Depending on the route, construction could take 2-3 seasons thereafter (see Appendix B, Letter of March 10, 1982 from Marvin Klinger to Leo Berry).

Economic Considerations

MPC estimated the cost for each month of delay in the completion date of the transmission line to Garrison in two ways: 1) the cost of buying replacement power for the full output of Unit 3, plus additional interest costs on Unit 3; and 2) the cost of buying replacement power only to relieve the deficits among the project owners created by a delay in commercial operation of Unit 3.

MPC estimates the cost of replacement power from oil or gas fired combustion turbines, including only the fuel cost, at 85.44 mills/kWh, less a saving on coal not burned at Colstrip 3 of 7.14 mills/kWh, for a net cost of 78.3 mills/kWh (see Appendix B). If Colstrip 3 runs at an average capacity factor of 75 percent, the average output is 525 average MW; with 730 hours in the average month the plant would produce 383 million kWh per month, valued at 78.3 mills each, or $30 million per month. If one assumes that replacement power is purchased only for the deficits of the five utility owners if commercial operation is delayed (estimated by MPC at

232 average MW for the year 1983-84 or 464 MW for the 6 months that Colstrip 3 would be on line during the period from July 1, 1983 to June 30, 1984), the additional cost due to delay would be $24 million per month.

In addition, MPC contends that a delay in commercial operation of the plant leads to additional AFUDC (allowance for funds during construction) of $10 million per month, which would increase the capitalized value of the plant at the time it enters the rate base.

DNRC disagrees with these values on several grounds. The points of disagreement revolve around the following four issues.

(1) MPC's deficit figures are based on critical water conditions, which are not appropriate for assessing the expected costs.

Data provided by MPC (Appendix C) presents the composite surplus/deficit of the five Colstrip project owners with and without Units 3 and 4 commercial. For the operating year 1983-84, assuming critical water conditions there is a deficit of 22 average MW for the five utilities combined if Unit 3 is commercial on January 1, 1984; the combined deficit increases by 210 average MW, to 232 average MW, if the plant is not available. However, critical water, a concept used for planning purposes to ensure reliability of resources for meeting loads, assumes a worse case availability of energy from the Pacific Northwest hydro system. The utilities do not all use the same criteria for assessing normal conditions, as some use a median water year and some use a 40 year average. Under normal water conditions the hydro system produces about 20-25 percent more generation than under critical water conditions. For MPC median water conditions add 67 average MW; for Pacific Power

and Light (PPL), 165 average MW are added; for Washington Water Power (WWP), 125 MW, for Portland General Electric (PGE), approximately 118 MW, and for Puget Sound Power & Light (PSPL), 200 MW. The total median water added is 672 MW for the five utilities. This means that under normal water conditions, if Colstrip 3 were not operational during the 1983-84 year, the consolidated surplus would be 440 average MW (672-232 average MW). With Colstrip 3 on line in January 1984 as planned, the consolidated surplus with normal water would be 713 + 23 or 736 average MW.

The point here is that the size of the deficit, if any, depends upon water conditions, and critical water, a conservative planning criterion with a relatively low probability of occurrence, should not be used to calculate the probable costs of a delay in the startup date of Unit 3. In fact, MPC's second estimate of the costs of delay, purchasing replacement power only for the actual deficits caused by the absence of Unit 3 would be zero not only under normal water conditions but under any water conditions providing at least 210 average MW above critical water.

(2) The replacement cost per kWh depends on the source of the replacement energy which will not all be produced from combustion turbines.

Replacement power may come from oil fired turbines if that is all that is available. If it is available from oil fired combined cycle plants with 40 percent efficiency, or newer oil fired steam plants with 40 percent efficiency the net fuel cost differential would drop from 78.3 mills/kWh to 53.6 mills/kwh. ($7.12 x 10-6/btu x 8530 btu/kWh = 60.73 mills/kWh; less 7.14 mills/kWh for coal saved = 53.59 mills). If inexpensive surplus hydro energy is available (from BPA or elsewhere) the net cost of replacement energy may be close to zero.

(3) Under different water conditions differing portions of the output of Unit 3 would (a) be replaced by oil or gas combustion turbines, (b) be replaced by combined cycle plants or higher cost steam plants, or (c) be sold to other utilities or other regions to displace energy from sources like (a) or (b). The expected cost of delay is a probability weighted average of costs under different water conditions.

As discussed above, the critical water criterion involves a particular set of conditions for the regional hydroelectric system that has a fairly low probability of occurrence. If there is critical water, some of the participants might have to buy replacement energy from oil fired combusion turbines, others might have to fire up combined cycle units (PGE has 301 MW of combined cycle capacity on its system at the Beaver plant), while others (PPL) night remain in a surplus condition but have less to sell. Under critical water calculations, if one ignores surplus sales, and if PGE ran the Beaver plant to make up the lost energy from its share of Colstrip 3 while the other deficient participants bought 78.3 mill power, the monthly cost of replacement energy would be $12.8 million. If the Colstrip energy of all deficient utilities were replaced by running the Beaver plant, the monthly cost would be $9.6 million (see Appendix D). This clearly understates the loss in critical water as it ignores the value of MPC's and PP&L's surpluses. Under water conditions less stringent than critical, deficits would shrink for some of the participants, requiring smaller purchases of expensive replacement energy; other participants would fire up expensive units for a shorter duration, while others might have bigger surpluses to sell. With good water conditions there might be sufficient excess hydro energy in the region that, given the limited capacity of the North-South Intertie, the surpluses of the participants might not be marketable at prices that cover operating costs of their higher cost thermal plants, which would then be shut down. The implication of all this is that because of the asymmetry between low and

high water conditions, the cost under median water cannot be used as a good estimate of expected costs.

In order to determine the full range of estimates of potential costs of a delay in the commercial date of Colstrip 3, one would have to analyze the economic dispatch models of each of the participants separately under all water conditions, and evaluate the costs of replacement purchase and revenues from surplus sales under those water conditions, and then take a probability weighted average of the outcomes.

DNRC does not currently have access to the utilities' dispatch models. The Board could request this information from the utilities; as noted above, this would allow the range of possible costs to be calculated but would not facilitate a more precise prediction of the actual costs that would occur.

If completion of the transmission line were to be delayed until the summer of 1984 as discussed previously, even using costs of half of the $9.6 million per month derived by assuming that only Puget, PGE and WWP have to replace their shares of Colstrip 3, and that they do so with combined cycle energy, the costs might total $38 million ($4.8 million per month x 8 months).

(4) It is double counting to add the plant interest costs to the replacement power costs to determine a "total" cost of delay.

MPC adds to the cost of replacement energy additional AFUDC of $10 million per month on the investment at Colstrip. DNRC does not believe this should be counted as a cost of delay. AFUDC is an accounting device designed to reimburse the utility

for committing its money while a plant is under construction and has not entered the rate base. Two ways of handling delay may be envisioned: 1) the utilities may argue to their respective Public Service Commissions that the delay is not their fault and the plant should go in the rate base on January 1, 1984 even if the lines are not completed; the Commissions may accept this argument, or 2) the Commissions may insist that the plants are not "used and useful" until they are in commercial operation. In the former case, rate payers will start paying interest and the utilities' return on equity, just as they would have if the plant operation were not delayed. If the units enter the rate base in January 1984, it is clear that the only additional costs the utilities will have to bear are the net costs of replacement energy.

An analogy to this situation would be if someone purchased a house and then was unable to move in for a month after the closing date. The person might have to make the mortgage payment and rent an apartment. It would be double counting to add the mortgage payment and the apartment rent and label the total the cost of the month's delay.

The second case is a bit more complicated. If the plant sits idle and is not in the rate base, interest payments and return on equity are capitalized during the delay period, then paid over the life of the plant. The plant investment will be greater and the depreciation, interest and return on equity paid by the ratepayers will be greater over the useful life of the plant. However, the higher costs to ratepayers will be offset by the delay in when they start. One must compare the net present value of these two alternatives to see which would impose higher costs overall. If the AFUDC rate is equal to the discount rate the present values of the alternatives are equal. If, as is likely, the discount rate is higher than the

AFUDC rate, the cost of delayed recovery is less than the cost of bringing the plant in the rate base in January 1984 as scheduled.

For example, suppose interest on debt, return on equity and AFUDC are all 12 percent. A plant costing $500 million with a 35 year life would require revenues of $5.10 million per month, or $61.2 million per year. If the discount rate is 12 percent (nominal), the present value of the required revenue to pay off the debt is $500 million. A delay of one year would raise the plant's cost to approximately $560 million. Revenue requirements to pay off this increased cost would now be $5.71 million per month, or $68.5 million per year. The present value, at the original scheduled date of operation, is still $500 million. If the discount rate is higher than the 12 percent AFUDC rate, say 15 percent (nominal), the present value of revenue requirements with no delay becomes $405 million; a one year delay would reduce this to $394 million because the higher discount rate more than offsets the AFUDC rate.

Effect on Ratepayers

Two additional uncertainties preclude any definitive assessment of the impact on ratepayers of a delay in operation of Unit 3. To the extent that surpluses of some of the Colstrip project owners are marketed to other utilities, a negotiated price would split any savings between the purchasing utility and the selling utility. This means part of the cost of delay, which was estimated by purchases in oil-fired generation, would be borne by the utilities which purchase the surplus. If the Federal Energy Regulatory Commission limited the price of the sale to the costs of production, most of the cost of delay would be borne by the purchasing utility.

The second major uncertainty lies in the method by which the Montana PSC incorporates sales and puchase of power. If sales are normalized for a historic test year, the benefits of surplus sales and the cost of delay in lost sales, would accrue to shareholders rather than ratepayers.

Social Considerations

Public opposition to the Townsend-Garrison segment has been particularly strong in the Boulder and Deer Lodge valleys, where people have organized to oppose the line (North Boulder Protective Association and the Deer Lodge Valley Resource Association). These organizations do not want the line through their communities at all.

Opposition to a 500 kV line would be very likely to occur on at least some portion of any proposed route. People are concerned about the visual effects, the potential health and biological effects, the degradation of property values, restrictions on land-use (particularly agricultural practices and future subdivision plans), and a host of other effects. Many of the public comments suggest that BPA mishandled public involvement, thereby increasing public outcry and opposition.

The social impact of re-opening the question of line location is likely to be large. If further studies are done, it is not possible to predict the outcome; there is no guarantee that more people will be satisfied if the location is changed. Some current opponents might be more satisfied, but other people may end up dissatisfied. Public comment on this report may provide more of an indication of the additional social impact that could be associated with further study than it is possible to predict at this time.

Construction Considerations

In the period just prior to District Judge Battin's decision, BPA approached the State Land Board for easements across state land sections that are crossed by the BPA Final Route. In negotiating for these easements BPA incorporated the essential elements of the construction guidelines adopted by the Board for the Colstrip-Townsend portion of the Colstrip transmission system in their construction specifications. Since these guidelines are part of the substantive requirements which have been imposed on sponsors of other 500 kV transmission projects in Montana, it appears that BPA should follow them along the entire route that it ultimately constructs on.

IV PRELIMINARY CONCLUSIONS AND OPTIONS FOR BOARD ACTION

Based on an examination of available information for the Townsend-Garrison segment of the Colstrip 500 kV transmission line, DNRC has formulated the following preliminary conclusions. This report identifies a number of minor concerns and problems in satisfying the criteria listed in 75-20-301 and 75-20-503 of the MFSA and the "factors" listed in ARM 36.7.304. However, any factors not specifically mentioned below are given generally adequate treatment by BPA and the cooperating federal agencies.

Methods of Siting the Line

There is no single "best" method of analyzing and comparing the many complex variables involved in siting a transmission line. The federal agencies employed a heavily quantitative method and appear to have made a good faith effort to follow it through. However, DNRC has identified a number of shortcomings.

No systematic attempt was made to gather substantive public input at the stages of the study when decisions such as selection of siting determinants, data items and weighting systems were made and when corridors were initially identified and compared. When public concern surfaced after selection of the Original Boulder-Deer Lodge Route, the study was re-opened to consider new alternatives, but the route changes that were then made in response to the public concerns are not comparable with the earlier study results.

The federal TER relied on earlier studies prepared by the Colstrip project owners and DNRC to identify alternate corridors. However, the earlier studies did not assume a substation at Garrison. The route segment between Townsend and Boulder that ultimately became part of the Original BDL Route was not identified until after the initial phases of corridor comparison in the federal studies. Subsequent federal analyses indicated that this segment had lower impacts than routes identified earlier.

The methods used did not clearly define the subjective decisions that were made to arrive at the numerical rankings assigned to the various alternative routes. As a result, the significance of numerical differences between impact scores is not clear. These considerations have a bearing on some of the preliminary conclusions in individual resource areas presented below.

SOCIAL AND ECONOMIC FACTORS

Social Service Impacts

Community level data concerning school capacities, the supply of transient lodging, and adequacy of services in communities within a reasonable commuting distance of construction reporting stations were not included in the federal studies, but were subsequently provided to DNRC (Frick 1982).

At the broad level of alternative corridor comparison, there would be no significant difference in community impacts between BPA's Original BDL Route and the BPA Final Route because these two routes are in such close proximity to one another. Alternative routes passing near Helena would probably result in less community service impacts than routes passing near Boulder simply because of Helena's larger size. However, the data provided (Frick 1982) suggest that impacts to community services on either the Original BDL or BPA Final Routes would be minimal, although there might be conflicts with tourist demand for transient lodging in Deer Lodge.

Social Concerns

Community concerns were not adequately addressed in BPA's studies until after the Original BDL Route was selected. These concerns are acknowledged in the August 1981 Record of Decision as being one of the major determinants which influenced selection of the BPA Final Route. Much of the public concern and controversy was generated because BPA did not adequately involve the public during the initial delineation and comparison of alternative routes. Due to the controversy that has already occurred, it is highly questionable whether it would be possible to obtain a measure of baseline social attitudes toward this project for any community that would be potentially impacted by any alternative route in the Townsend-Garrison area.

Health and Safety Concerns

Health and safety issues and electrical effects that may be caused by the line were adequately addressed by BPA with the following exception. There is no fixed right-of-way width for 500 kV lines, but BPA's 125 ft right-of-way is relatively narrow. The width is important for purposes of keeping dwellings and daily human activities a sufficient distance away from the lines. Based on recent communications from BPA, potential noise impacts outside the right-of-way appear likely. This issue is most significant in urban areas, but would also affect isolated residences located near the line. While the special circumstances that would be necessary for the impact to occur - human habitation next to the right-of-way and wet weather - are not sufficiently serious to indicate a modification of BPA's design or of the right-of-way width, BPA should be required to adequately deal with noise complaints after the line is built.

CULTURAL FACTORS

LAND USE

Land use was given adequate treatment in BPA's corridor studies. As discussed above, considerable public controversy was generated in the Boulder and Deer Lodge areas; this caused impacts on agriculture to be given a very high weight in the selection of the BPA Final Route. This weighting seems to be more a measure of public opposition to siting the line on private land than a weighting of the actual impacts to agricultural land that would occur, particularly if careful attention were given to avoiding these impacts through centerline selection and tower placement.

On September 13, 1973, the Board set out a policy that existing corridors must be used if the need for a new corridor is not clearly justified. Both the Original BDL and BPA Final Routes open up new areas while the Helena Route generally follows an existing transportation corridor at least as far west as the Mullan Pass-Elliston area. The federal adjustment to impact scores for "paralleling" (USDI 1978, Section V) was primarily made in relation to transmission lines. No adjustments were made for siting parallel to highways, railroads or communications lines.

HISTORIC AND ARCHAEOLOGICAL CONCERNS

The federal EIS's did not identify impacts to specific historic, architectural, archaeological and cultural sites since this is normally done at the centerline level, not during the corridor analysis. Instead, BPA stated that it would comply

with the Historic Preservation Act. Compliance with this Act would result in full identification of sites, evaluation of their significance, determination of impacts, appropriate mitigation, and would satisfy MFSA.

For BPA's Final route, the State Historic Preservation Officer reports that compliance procedures are being followed but are not yet complete.

RECREATION

Recreation impacts were adequately treated. However, given the overall problems with methods discussed previously, it is not possible to determine the significant differences in recreation impact among the alternative routes.

VISUAL CONCERNS

Visual concerns were given generally adequate attention, and consistently high weightings in corridor comparison. However, the study results were given contradictory treatment in route selection. Based on the federal numerical rankings of the alternatives, the Original BDL Route was slightly superior visually to the Helena Route, but the BPA Final Route was worse than either. However, the numerical differences among the alternatives were not significant enough to determine which route has the least visual impacts.

Visual impacts to historic sites outside the right-of-way but within the line of sight were not addressed. BPA should consult with SHPO for a determination of the magnitude and significance to such sites and implement appropriate mitigation during the centerline process if recommended by SHPO.

EARTH SCIENCE CONCERNS

Water resources information and geological and climatic information were adequately presented and discussed in the federal documents. Since transmission lines can be built over nearly any terrain, most geologic considerations are important only during the centerline evaluation.

From the data provided it appears that none of the alternate corridors are particularly advantageous considering only geologic factors and icing of the lines. Small-scale problem areas can occur with any of the corridors but can be dealt with in centerline location.

BIOLOGICAL SCIENCE CONCERNS

BPA's information concerning wildlife and vegetation was generally accurate and comprehensive. The methods used to assess impacts to the biological resources appear to adequately determine impact risk, despite some methodological problems.

The evaluation of alternative corridors was comprehensively and adequately done. The department agrees with BPA's conclusions that: 1) the BPA Final Route would potentially have the greatest effect on the wildlife and plant resources, and 2) the Helena Route would minimize (to the degree possible) impacts to the wildlife and vegetation resources.

ENGINEERING FACTORS

For the most part engineering factors are of minor concern because major technical system alternatives and the need for the project are not issues in this analysis. Engineering factors relating to health and safety issues and social concerns are discussed elsewhere.

SUMMARY

Based on numerical impact scores from the federal studies, the BPA Final Route ranks best for only one of the 12 siting determinants considered in the federal studies. That determinant, agricultural land, was given a high weight in the corridor ranking process to reflect strong public concern that agricultural lands should be avoided. The BPA Final Route ranks worst for 7 of the 12 determinants, and is also worst in terms of the total impact scores when compared to the Original BDL Route and the Helena Route. DNRC generally agrees with these results but due to the methodological problems discussed earlier, could not determine which route is most acceptable for all the individual environmental, social and cultural factors.

While it is clear that no individual route for a transmission line will minimize impacts to all resource areas, as noted above there was a definite lack of correlation between the federal study results and the federal decision to select the BPA Final Route. The available information indicates that the concerns of residents and landowners along the Original BDL Route were a primary determinant in the selection of this route; the federal Record of Decision clearly states that this alternative is not environmentally preferred for the majority of the study determinants. While DNRC agrees that public involvement is critically important in

making siting decisions, public concerns should have been incorporated at the beginning of the federal process and systematically compared with the other determinants throughout the study.

Additional Impact Considerations

Scheduling

Construction on the Townsend-Garrison line was originally scheduled to begin in March 1982 and to be completed in October 1983. BPA has indicated the construction schedule is extremely tight and there are no significant possibilities for shortening the schedule. DNRC was unable to identify any measures which would be effective in significantly reducing the construction schedule other than possibly adding more and smaller "spreads" to the construction plan. BPA does not believe that this could be done effectively. If construction is not completed by early winter in 1983, weather conditions may delay completion until the summer of 1984.

BPA has stated that if it were to construct the line on any route other than the BPA Final Route, Federal Register notice and filing of a new Record of Decision would be required, followed by approximately a 2-year period for survey, design, material changes and right-of-way acquisition before construction could start. Although BPA does not clarify this statement, it apparently refers to the time required to prepare to construct on an entirely different route rather than to make minor modifications to the BPA Final Route. Depending on the route, construction could take 2-3 seasons thereafter.

Economic Considerations

MPC estimated the cost for each month of delay in the completion date of the transmission line to Garrison in two ways: 1) the cost of buying replacement power for the full output of Unit 3, plus additional interest costs; and 2) the cost of buying replacement power only to relieve the net deficits among the participants created by a delay in commercial operation of Unit 3.

MPC estimates the cost of replacement power from oil or gas fired combustion turbines for Colstrip Unit 3 (assuming 525 average MW) at $30 million per month. If one assumes that replacement power is purchased only for the deficits of the five utility owners if commercial operation is delayed (estimated by MPC at 232 average MW for the year 1983-84 or 464 MW for the 6 months that Colstrip 3 would be on line during the period from July 1, 1983 to June 30, 1984), the additional cost due to delay would be $24 million per month.

In addition, MPC contends that a delay in commercial operation of the plant leads to additional AFUDC (allowance for funds during construction) of $10 million per month.

DNRC disagrees with these values on the following grounds:

(1) MPC's deficit figures are based on critical water conditions which are not necessarily reasonable for assessing the expected costs.

(2) The replacement cost per kWh depends on the source of the replacement energy which would not necessarily be produced from combustion turbines, a worst case option.

(3) Under different water conditions differing portions of the output of Unit 3 would (a) be replaced by oil or gas combustion turbines, (b) be replaced by combined cycle plants or higher cost steam plants, or (c) be sold to other utilities or other regions to displace energy from sources like (a) or (b). The expected cost of delay could be calculated by taking a weighted average of the costs with different possible water conditions.

(4) It is double counting to add the plant interest costs to the replacement power costs to determine a "total" cost of delay.

The critical water criterion involves a particular set of conditions for the regional hydrdoelectric system that has a fairly low probability of occurrence. If there is critical water, some of the participants might have to buy replacement energy from oil fired combustion turbines, others might have to fire up combined cycle units (PGE has 301 MW of combined cycle capacity on its system at the Beaver plant), while others (PPL) might remain in a surplus condition but have less to sell. Under critical water conditions if one ignores surplus sales, and if PGE ran the Beaver plant to make up the lost energy from its share of Colstrip 3 while the other deficient participants bought 78.3 mill power, the monthly cost of replacement energy would be $12.8 million. If the Colstrip energy of all deficient utilities were replaced by running the Beaver plant, the monthly cost would be $9.6 million

(see Appendix D). This clearly understates the loss in critical water as it ignores the value of MPC's and PP&L's surpluses. Under water conditions less stringent than critical, deficits would shrink for some of the participants, requiring smaller purchases of expensive replacement energy; other participants would fire up expensive units for a shorter duration, while others might have bigger surpluses to sell.

If completion of the transmission line were to be delayed until the summer of 1984 as discussed previously, even using costs of half of the $9.6 million per month derived by assuming that only Puget, PGE and WWP have to replace their shares of Colstrip 3, and that they do so with combined cycle energy, adjusting MPC's more conservative estimate, costs might total $38 million ($4.8 million per month x 8 months).

Two additional uncertainties preclude any definite assessment of the impact on ratepayers of a delay in operation of Unit 3. To the extent that surpluses of some of the Colstrip project owners are marketed to other utilities, a negotiated price would split any savings between the purchasing utility and the selling utility. This means part of the cost of delay, which was estimated by purchases of oil-fired generation, would be borne by the utilities which purchase the surplus. (If the Federal Energy Regulatory Commission limited the price of the sale to the costs of production, most of the cost of delay would be borne by the purchasing utility.)

The second major uncertainty lies in the method by which the Montana PSC incorporates sales and purchase of power. If sales are normalized for a historic test year, the benefits of surplus sales and the cost of delay in lost sales would accrue to shareholders rather than ratepayers.

Social Considerations

Public opposition to the Townsend-Garrison segment has been particularly strong in the Boulder and Deer Lodge valleys. The social impact of re-opening the question of line location is likely to be large and there is no guarantee that more people will be satisfied if the location is changed.

CONSTRUCTION CONSIDERATIONS

In the period just prior to District Judge Battin's decision, BPA approached the State Land Board for easements across State Land sections that would be crossed by the BPA Final Route. In negotiating for these easements BPA agreed to incorporate the construction guidelines adopted by the Board for the Colstrip-Townsend portion of the Colstrip transmission lines into their guidelines. Since the Board's guidelines are part of the substantive requirements which have been imposed on sponsors of other 500 kV transmission projects in Montana, BPA should follow them for the entire route it ultimately constructs on.

OPTIONS FOR BOARD ACTIONS

The Board has the following three options to consider in reaching a decision concerning BPA's compliance with the substantive requirements of the Major Facility Siting Act:

1) Determine that BPA's plans for constructing the line on the BPA Final Route comply with the substantive requirements.

2) Determine that BPA's plans do not comply with the substantive requirements and select an alternative route.

3) Determine that BPA's plans comply if certain conditions are met.

REFERENCES CITED

Bick, P. 1982.
Architectural Historian, Helena: Historic Preservation Office. Telephone conversation (March 12, 1982) with Edrie Vinson, Department of Natural Resources and Conservation. Helena.

Brant, L.A. 1980.
A Palynological Investigation of Postglacial sediments at two locations along the continental divide near Helena, Montana. Unpublished PhD Thesis. The Pennsylvania State University.

Choquette, W., Holstine, C., and Bies, M. 1981.
A Cultural Resources Overview of the Bonneville Power Administration's Proposed Garrison-Townsend 500 kV Transmission Line, Powell, Jefferson, and Broadwater Counties, Montana. Bonneville Cultural Resources Group, Eastern Washington University, Cheney, Washington.

Cole, K. and Comp, A. 1979.
Office of Archaeology and Historic Preservation, National Park Service, Department of the Interior, Washington, D.C. Conversation with Edrie Vinson, Deputy State Historic Preservation Officer, State Board of Education, Montana Historical Society.

Davis, J. (compiler) 1962.
<u>Shallow diggins: tales from Montana ghost towns</u>. Caxton Printers, Caldwell, Idaho.

Duffy, R. 1982.
Owner, Montana Gallery and Book Shoppe, Helena. Telephone conversation (March 11, 1982) with Edrie Vinson, Montana Department of Natural Resources and Conservation. Helena.

Durfee, G. 1982.
Manager, Power Plant Siting Program, Minnesota Environmental Quality Board. Telephone conversation (March 10, 1982) with Paul Stolen, Montana Department of Natural of Natural Resources and Conservation. Helena.

Eddy, R. 1982.
Design Engineer, Bonneville Power Administration, Portland. Telephone conversation (March 29) with Paul Stolen, Department of Natural Resources and Conservation, Helena.

Florin, L. 1971.
Montana, Idaho, and Wyoming ghost towns. Seattle, Washington. Superior Printers.

Frick, J. 1982.
Engineering Manager, Bonneville Power Administration, Portland. Letter (April 1) to Leo Berry, Director, Department of Natural Resources and Conservation, Helena.

Golden, J., Ovellette, P., Saari, S., and Cherenisinoff, P. 1979.
Environmental Impact Data Handbook. Ann Arbor Service Publishers, Inc. Ann Arbor.

Henderson, J. and Scott, W. 1981.
"The Economic Impact of High Voltage Transmission Towers on Agricultural Lands." Electric Power Research Institute. Environmental Concerns in Right-of-Way Management. Proceedings of Second Symposium held October 16-18, 1979. Mississippi State University.

Herrold, J.E. 1979.
Health and safety effects of EHV electric transmission lines. A review of the literature. Michigan Public Service Commission, Department of Commerce. Lansing, Michigan.

Holiday, R.G. 1982.
Administrator, Park Division, Helena: Montana Department of Fish, Wildlife and Parks. Telephone conversation (March 11, 1982) with Edrie Vinson, Montana Department of Natural Resources and Conservation. Helena.

MWRI. 1981a.
Transmission Line Construction Worker Profile and Community/Corridor Resident Impact Survey. Final Report to Bonneville Power Administration, prepared by Mountain West Research, Inc., Billings, Montana.

MWRI. 1981b.
Electric Transmission Line Effects on Land Values: A Critical Review of the Literature. Prepared for Bonneville Power Administration by Mountain West Research, Inc., Billings, Montana.

Malefyt, J. 1981.
"Farms and Wires." Electric Power Research Institute. Environmental Concerns in Rights-of-Way Management. Proceedings of Second Symposium held October 16-18, 1979. Mississippi State University.

Melton, D. 1982.
Curator of Collections and Site Reports, Department of Anthropology, University of Montana, Missoula. Telephone conversation (March 11, 1982) with Edrie Vinson, Montana Department of Natural Resources and Conservation. Helena.

Mierendorf, R.R., Holstine, C. Masten, R., and Lindeman, G.W. 1982.
A Cultural resources survey and site testing of the Bonneville Power Administration's Garrison-Townsend Transmission Line, Powell, Jefferson, and Broadwater Counties, Montana. Bonneville Cultural Resources Group, Report Number 100-22, Eastern Washington University Reports in Archaeology and History. Cheney, Washington.

Miller, D.C. 1974.
Ghost towns of Montana. Boulder, Colorado. Pruett Press.

Mineral Research Center. 1980.
Cultural Resources Inventory and Evaluation: Colstrip to Broadview. Butte.

Mineral Research Center. 1981.
Cultural Resources Inventory and Evaluation: Broadview to Townsend. Butte.

Montana Department of Natural Resources and Conservation. 1974.
Draft environmental impact statement on Colstrip Electric Generating Units 3 & 4, 500 Kilovolt Transmission Lines and Associated Facilities. Helena.

Montana Department of Natural Resources and Conservation. 1978.
Draft EIS Proposed 115 kV transmission line from Troy to Mount Vernon Mine. Helena.

Montana Department of Natural Resources and Conservation. 1977.
Final environmental impact statement on Anaconda-Hamilton 161 kV transmission line. Helena.

Montgomery, J. 1981.
"Colstrip Transmission Project: 1971-1981." Working paper prepared for Environmental Analysis Branch of the Division of Transmission Engineering, Bonneville Power Administration. Portland.

Shah, K.R. 1974.
Electromagnetic and electrostatic considerations in EHV line design, location and operation. Commonwealth Associates, Inc. Paper presented at the 1974 Annual Conference, S.E. Electric Exchange, April 17-19. Washington D.C.

Sherfy, M. 1982.
Deputy Historic Preservation Officer, State Board of Education, Montana Historical Society. Telephone conversation (March 10 and 11, 1982) with Edrie Vinson, Department of Natural Resources and Conservation. Helena.

U.S. Department of Energy. 1975.
Electrical effects of transmission lines. Bonneville Power Administration. September 15. Portland, Oregon.

U.S. Department of Energy. 1982.
Specifications for the Construction of the Broadview-Garrison No. 1 and 2 Townsend-Garrison Section Schedule II, Mile 171 to 206. Bonneville Power Administration. Portland.

U.S. Department of Interior. 1978.
Colstrip Transmission Environmental Report. Draft Interagency Colstrip Transmission Corridor Analysis. (Prepared by Bonneville Power Administration, Bureau of Indian Affairs, Bureau of Land Management, Forest Service. Billings.

U.S. Department of Interior. 1979a.
Colstrip Project Draft EIS., Vol. 1-3. Prepared by Bureau of Land Management, Bonneville Power Administration, Forest Service. Billings.

U.S. Department of Interior. 1979b.
Colstrip Project Final EIS.,Vol. 1-3. Prepared by Bureau of Land Management, Bonneville Power Administration, Forest Service. Billings.

U.S. Department of Interior. 1979c.
Record of Decision, Federal Transmission Corridor, Colstrip Project. Bureau of Land Management and Forest Service. September 21. Billings.

U.S. Department of Interior. 1979d.
Federal Corridor Option Summary: Colstrip Transmission System. Prepared by the Bureau of Land Management, Forest Service, and Bonneville Power Administration. Billings.

U.S. Department of Interior. 1981a.
Draft Supplement to the Colstrip Project EIS. Prepared by Bureau of Land Management, Bonneville Power Administration, Forest Service. Billings.

U.S. Department of Interior. 1981b.
Final Supplement to the Colstrip Project EIS. Prepared by Bureau of Land Management, Bonneville Power Administration, Forest Service. July. Billings.

U.S. Department of Interior. 1981c.
Record of Decision on the Final Supplement to the Colstrip Project EIS. Prepared by the Bureau of Land Management, Bonneville Power Administration, Forest Service. August 8. Billings.

U.S. Department of Interior. 1982a.
Preliminary Centerline Environmental Assessment. Colstrip Project, 500 kV Transmission Lines. Townsend to Garrison Substation. Prepared by the Bureau of Land Management, Forest Service, and Bonneville Power Administration. (The document was distributed by the BPA under a different title: "Mitigation Report.")

Varner, J. and Patel, S.
Irrigation Systems and Their Impact Upon Existing and Proposed Transmission Lines. Presented at the Third Symposium on Environmental Concerns in Rights-of-Way Management. San Diego, February, 1982.

Westinghouse Environmental Systems. 1973.
Colstrip Generation and Transmission Project. Applicant's Environmental Analysis.

Wilson, J. 1982.
Chief, Montana Promotion Bureau, Department of Commerce. Telephone conversation (March 11, 1982) with Edrie Vinson, Montana Department of Natural Resources and Conservation. Helena.

Wolle, M.V. 1963.
Montana pay dirt: a guide to mining camps of the treasure state. Swallow Press. Chicago.

APPENDIX A:

Choquette, W., Holstine, C., and Bies, M. 1981.
A Cultural Resources Overview of the Bonneville Power Administration's Proposed Garrison-Townsend 500 kV Transmission Line, Powell, Jefferson, and Broadwater Counties, Montana. Bonneville Cultural Resources Group, Eastern Washington University, Cheney, Washington.

Mierendorf, R.R., Holstine, C. Masten, R., and Lindeman, G.W. 1982.
A Cultural resources survey and site testing of the Bonneville Power Administration's Garrison-Townsend Transmission Line, Powell, Jefferson, and Broadwater Counties, Montana. Bonneville Cultural Resources Group, Report Number 100-22, Eastern Washington University Reports in Archaeology and History. Cheney, Washington.

U.S. Department of Energy. 1982.
Specifications for the Construction of the Broadview-Garrison No. 1 and 2 Townsend-Garrison Section Schedule II, Mile 171 to 206. Bonneville Power Administration. Portland.

U.S. Department of Interior. 1978.
Colstrip Transmission Environmental Report. Draft Interagency Colstrip Transmission Corridor Analysis. (Prepared by Bonneville Power Administration, Bureau of Indian Affairs, Bureau of Land Management, Forest Service. Billings.

U.S. Department of Interior. 1979a.
Colstrip Project Draft EIS., Vol. 1-3. Prepared by Bureau of Land Management, Bonneville Power Administration, Forest Service. Billings.

U.S. Department of Interior. 1979b.
Colstrip Project Final EIS.,Vol. 1-3. Prepared by Bureau of Land Management, Bonneville Power Administration, Forest Service. Billings.

U.S. Department of Interior. 1979c.
Record of Decision, Federal Transmission Corridor, Colstrip Project. Bureau of Land Management and Forest Service. September 21. Billings.

U.S. Department of Interior. 1979d.
Federal Corridor Option Summary: Colstrip Transmission System. Prepared by the Bureau of Land Management, Forest Service, and Bonneville Power Administration. Billings.

U.S. Department of Interior. 1981a.
Draft Supplement to the Colstrip Project EIS. Prepared by Bureau of Land Management, Bonneville Power Administration, Forest Service. Billings.

U.S. Department of Interior. 1981b.
Final Supplement to the Colstrip Project EIS. Prepared by Bureau of Land Management, Bonneville Power Administration, Forest Service. July. Billings.

U.S. Department of Interior. 1981c.
Record of Decision on the Final Supplement to the Colstrip Project EIS. Prepared by the Bureau of Land Management, Bonneville Power Administration, Forest Service. August 8. Billings.

U.S. Department of Interior. 1982a.
Preliminary Centerline Environmental Assessment. Colstrip Project, 500 kV Transmission Lines. Townsend to Garrison Substation. Prepared by the Bureau of Land Management, Forest Service, and Bonneville Power Administration. (The document was distributed by the BPA under a different title: "Mitigation Report.")

APPENDIX B

DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

TED SCHWINDEN, GOVERNOR 32 SOUTH EWING

STATE OF MONTANA

(406) 449-3712 HELENA, MONTANA 59620

March 8, 1982

Marvin Klinger
Engineering and Construction
U.S. Bonneville Power Administration
Department of Energy
P.O. Box 3621
Portland, Oregon 97208

Dear Marvin:

Pursuant to District Judge Battin's decision, the Board of Natural Resources and Conservation will need information addressing Administrative Rules of Montana 36.7.304. As we discussed this morning, of particular immediate concern is the need for certain economic and cost-related information to make a determination concerning Bonneville Power Administration's compliance with the substantive standards of the Major Facility Siting Act for the Townsend-Garrison portion of the Colstrip transmission system. The items needed are as follows:

1. Documentation and discussion of options available to the Colstrip Consortium if Unit #3 is ready for operation but the electricity cannot be transmitted to Garrison. This should include documentation of the costs that would accrue to each of the Colstrip project owners for each option relative to the costs that would accrue if the Townsend-Garrison segment is completed on schedule.

2. Documentation and discussion of cost effective management alternatives that may exist for delaying completion of Unit #3.

3. Documentation and discussion of reasonable, short term transmission system alternatives other than completing construction of the intermediate substation and the lines to Garrison, Montana which may be available within the time schedule determined by the anticipated operating date for Unit #3.

4. Documentation and discussion of the costs of construction for a route from Townsend through the Helena area to Garrison. This information should also include an estimate of the costs and time that would be involved for the federal government to incorporate such a route in their decision-making process.

5. Documentation and discussion of management options which would expedite the easement acquisition and construction process for the Townsend-Garrison portion of the project. This discussion should include the relative cost and time savings associated with each option.

Please note that the items listed above do not necessarily constitute all of the information the Board may require. I anticipate that my staff will be in contact with your staff as necessary for assistance in clarifying and interpreting the information furnished under each of the aforementioned items.

Sincerely,

Leo Berry
Director

LB/jb

cc: Paul Schmechel

Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

In reply refer to: EH

March 10, 1982

Mr. Leo Berry
State of Montana
Department of Natural Resources and Conservation
32 South Ewing
Helena, Montana 59620

Dear Mr. Berry:

Your letter of March 8, 1982, requested information pursuant to Judge Battin's decision. As we agreed in our meeting March 8, 1982, that information, addressing Administrative Rules of Montana 36.7.304, is contained in documents previously furnished the Department during the State and Federal environmental process. Those documents are shown on the enclosed list with the approximate date on which they were made available. For your assistance, we are forwarding separately additional copies of available documents.

In response to the additional five items listed in your letter, Montana Power Company should be better able to furnish information on Items 1, 2, and 3, and we understand they are doing so.

Information on Item 4 concerning a route from Townsend through the Helena area to Garrison is included in the Federal Environmental Impact Statement (EIS) material previously furnished. The analysis summary and information for the route can be found in the Federal Corridor Option Summary on Page 19. It was considered by the land management agencies in arriving at their final route decision, which is documented in the Record of Decision dated September 21, 1979.

To change this Record of Decision would require Federal Register notice and filing of a new Record of Decision—then approximately a 2-year period for survey, design, material changes, and right-of-way acquisition before construction could start.

In response to Item 5, this is our analysis of the options of delaying the start of the construction of the Townsend-Garrison 500-kV transmission line and the expected consequences.

The normal construction schedule for a new double-circuit 500-kV transmission line of this length and location is a 3-year period. There are a number of

considerations in development of a construction schedule: line length, voltage, size—double versus single circuit, terrain, length of construction season, and accessibility. The Townsend-Garrison line is a 500-kV double circuit, 91.74 miles in length. The length of the construction season in this area is largely dependent upon the weather and elevation, and averages in the order of 6-7 months each year. Normally, the first year is devoted to construction of access roads and clearing of the right-of-way. Construction of the transmission line is accomplished during the following 2 years. Because of the required October 1983 completion date, we have compressed what we consider a normal 3-year schedule into 2 years. Due to the tremendous amount of work to be accomplished within the current 2-year schedule, the Townsend-Garrison project has been divided into three schedules. This was done to allow more than one contractor to perform the work. In addition, we anticipate the contractors will utilize much overtime work and extra days of work in each week.

The only management options available to shorten the process are to delay the bid opening and award of contract beyond the present March 25, 1982, date.

A 2-month delay would further compress an already tight schedule. It would increase the risk factor to a level where we do not believe the line could be completed by October 1983. It is possible that the line could be completed by December 1, 1983, under favorable weather conditions. A 4-month delay in our view would make it impossible to meet a fall energization and would delay the line until summer 1984. A point is soon reached where it becomes a physical impossibility to accomplish the amount of work involved in this project.

Our contractor, under the present schedule, must clear the right-of-way, construct all access roads, and have sufficient towers erected to string approximately one-third of the project by the end of the 1982 season in order to have a realistic chance to complete the project by October 1983.

Sincerely,

Marvin Klinger

Marvin Klinger
Assistant Administrator for
Engineering and Construction

Enclosure

INFORMATION AVAILABLE TO THE STATE OF MONTANA

COLSTRIP PROJECT MANAGEMENT APPLICATION. Estimated Availability Date: June 6, 1973.

MONTANA BOARD HEALTH ENVIRONMENTAL SCIENCE. HEARING ON THE APPLICATION FOR COLSTRIP 3 AND 4, VOLUMES 1-50. Estimated Availability Date: 1975.

MONTANA BOARD NATURAL RESOURCES CONSERVATION. HEARINGS ON THE APPLICATION FOR CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AND PUBLIC NEED FOR COLSTRIP. VOLUMES 1-50. Estimated Availability Date: 1976.

MONTANA DEPARTMENT NATURAL RESOURCES CONSERVATION. DRAFT ENVIRONMENTAL IMPACT STATEMENT ON COLSTRIP ELECTRIC GENERATING UNITS 3 & 4, 500 KILOVOLT TRANSMISSION LINES & ASSOCIATED FACILITIES, VOLUMES 1-4. Estimated Availability Date: 1974.

MONTANA DEPARTMENT NATURAL RESOURCES CONSERVATION. FINAL ENVIRONMENTAL IMPACT STATEMENT ON COLSTRIP ELECTRIC GENERATING UNITS 3 & 4, 500 KILOVOLT TRANSMISSION LINES & ASSOCIATED FACILITIES. Estimated Availability Date: January 1975.

WESTINGHOUSE ENVIRONMENTAL SYSTEMS. COLSTRIP GENERATION AND TRANSMISSION PROJECT: APPLICANT'S ENVIRONMENTAL ANALYSIS. MONTANA POWER COMPANY. Estimated Availability Date: November 1973.

BONNEVILLE POWER ADMINISTRATION. COLSTRIP TRANSMISSION ENVIRONMENTAL REPORT: FEDERAL INTERAGENCY COLSTRIP TRANSMISSION CORRIDOR ANALYSIS. Estimated Availability Date: August 1978.

FINAL SUPPLEMENT TO THE COLSTRIP PROJECT EIS, TOWNSEND-GARRISON. Estimated Availability Date: July 1981.

COLSTRIP PROJECT EIS, VOLUMES 1-3. Estimated Availability Date: July 1979.

FEDERAL CORRIDOR OPTION SUMMARY. Estimated Availability Date: August 1979.

COLSTRIP TRANSMISSION WORK MANAGEMENT PLAN FOR PREPARATION OF TRANSMISSION ENVIRONMENTAL REPORT. Estimated Availability Date: March 1977.

BONNEVILLE POWER ADMINISTRATION (BPA). EIS ON THE ROLE OF THE BONNEVILLE POWER ADMINISTRATION IN THE PACIFIC NORTHWEST POWER SUPPLY SYSTEM. Estimated Availability Date: 1981.

FINAL ENVIRONMENTAL STATEMENT, GENERAL CONSTRUCTION AND MAINTENANCE PROGRAM. Estimated Availability Date: 1974.

BOARD OF NATURAL RESOURCES AND CONSERVATION CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AND PUBLIC NEED. Estimated Availability Date: July 22, 1976.

MONTANA POWER COMPANY

GENERAL OFFICES 40 EAST BROADWAY BUTTE MONTANA 59701 • TELEPHONE 406-723-5421

ROBERT L. LABRIE

SENIOR VICE PRESIDENT
ENGINEERING AND TECHNOLOGY

March 10, 1982

Mr Marvin Klinger
Assistant Administrator for
Engineering and Construction
Bonneville Power Administration
P O Box 3621
Portland, OR 97208

Dear Marvin:

This letter will present our views regarding the first three items of information requested of BPA by Leo Berry, Director of the Montana Department of Natural Resources and Conservation, in his March 8, 1982 letter to you. While we do not agree that much of the information requested is germaine at this time to the question of compliance by BPA with the "substantive standards" under the Major Facility Siting Act, we nevertheless submit the following:

1. If Colstrip Unit #3 is completed on schedule ready for turbine roll in October 1983, but the 500 kV transmission circuits from Colstrip to Broadview to Townsend to Garrison and the Garrison Substation are not completed by that time, the unit will sit idle until the transmission facilities are completed. Then testing and shakedown can be accomplished with commercial operation to follow about three months later.

   Without the 500 kV transmission facilities in place to and including Garrison Substation, there is no transmission capability available on the underlying system to accommodate Colstrip Unit #3 power. The system is only marginally capable of handling all of Colstrip Units #1 and #2 power because of the delays already suffered by the 500 kV project. That project was planned to enhance the reliability of transmitting #1 and #2 power in addition to handling #3 and #4 requirements.

   The costs of Unit #3 sitting idle awaiting transmission are estimated to consist of two major items:

   A. the difference in fuel cost between oil or gas fuel for replacement energy (if available) and the replaced coal fuel; and

   B. the additional interest cost (or AFUDC) which would accumulate during the delay.

   These costs are estimated at 78.3 mills/kWh of lost production capability and about $10,000,000 per month of additional AFUDC (see Attachment A). These costs, of course, ultimately will be borne by our ratepayers.

For each month of delay in completing the transmission, these costs will ultimately amount to $30,000,000 (525,000 average kW X 730 hours/month X 78.3 mills/kWh) in replacement power costs plus $10,000,000 additional AFUDC; a total of $40,000,000 per month, based upon full load operation. It is assumed that the value of the surpluses is the fuel savings.

Ignoring any revenues from surplus sales and evaluating only the cost of replacement power to cover the deficits would result in a total cost of $20.5 million per month.

Our latest composite tabulation of the projected loads and resources of the five participants in the Colstrip Project indicate surpluses and deficiencies beginning in the operating year 1983-84 as follows. These figures are taken from unpublished data just now being prepared for the annual PNUCC Regional Forecast to be published later this spring. We believe that these average energy figures are accurate, but that the peak figures understate the deficits from those that will be ultimately used, because complete analysis of the reserve requirements has not yet been made.

Figures Are MW	1983-84		1984-85		1985-86		1986-87	
With Critical Water	Peak	Avg	Peak	Avg	Peak	Avg	Peak	Avg
Composite Surplus/ (Deficit) With Colstrip #3 and #4	1,266	23	559	(176)	394	(127)	(6)	(203)
Composite Surplus/ (Deficit) w/o Colstrip #3 and #4	671	(185)	(36)	(579)	(796)	(959)	(1,196)	(1,123)

2. There are no cost-effective management alternatives to completing construction of Colstrip Unit #3 in accordance with the present schedule. To delay the schedule would result in additional AFUDC of approximately $10,000,000 per month plus estimated additional construction management costs of about $5,000,000 per month. In addition, any substantial delay now would expose the Project to potential claims by subcontractors and vendors for their costs of delay and for extended warranties. The extent of such potential claims is undetermined.

3. There are no reasonable, short-term transmission system alternatives available to accommodate any substantial portion of Colstrip Unit #3's 700 MW of generation. The existing system is marginal with only Units #1 and #2 power and cannot accept additional Unit #3 power absent the 500 kV transmission.

Mr Marvin Klinger
March 10, 1982
Page 3.....

There are no paths through Canada and no paths through Wyoming and Idaho which are not already marginal in their ability to transmit their own requirements to the West from base-load coal-fired units in Wyoming and Colorado.

Very truly yours,

Robert J Labrie

RJL/DBG/jd
Enclosure

cc: Leo Berry - DNR&C
WP Schmechel
DB Gregg
JL Peterson
DE Olson

Estimated Costs of Delay for Colstrip Unit #3

Cost of Energy Purchases - If Available

Estimated cost of natural gas or oil for boiler fuel in 1984 delivered to a gas- or oil-fired plant in the Northwest - $7.12/million Btu.

(This compares with Canadian natural gas delivered to Billings for the Bird Plant in 1981 @ $5.33/mmBtu. The estimate is derived from Data Resources, Inc's forecast of world oil prices and is equivalent to processed oil delivered in 1984 at $42.70/barrel.)

Estimated cost of coal at Colstrip for Units #3 and #4 in 1984 = $11.37/ton = $0.661/million Btu.

(This compares with a January 1, 1980 contract price of $8.17/ton. Escalation of indexed costs is estimated by Western Energy Company at approximately 80 cents/ton/year for four (4) years to 1984.)

Unit cost of gas- or oil-fired energy = $7.12 X 10^{-6}/Btu X 12,000 Btu/kWh = 85.44 mills/kWh.

Unit saving of coal energy not generated at Colstrip = $0.661 X 10^{-6}/Btu X 10,800 Btu/kWh = 7.14 mills/kWh.

Difference = 85.44 - 7.14 = 78.3 mills/kWh.

Estimated Cost of Colstrip Unit #3

Estimated Cost of Colstrip #3 to 1/1/84	:	$ 534,380,000
Estimated Cost of Common Facilities to 1/1/84	:	285,527,000
Estimated Cost of Colstrip-Townsend Transmission to 1/1/84	:	190,374,000
Total Cost for Colstrip #3 to 1/1/84 (Excluding AFUDC)	:	$1,010,281,000

Estimated AFUDC Rate in 1984 = 12% = 1% Per Month

APPENDIX C

1983–84
Colstrip 3 & 4 Participants Load/Resource Tab.

3/15/82 — By phone

① 156 withdrawal on 1 yr. notice
② Net of Maint.
③ Speculative — Composite Grand
Figures are Avg. Mw.

	Montana Power	Puget Sound Power & Light	Portland General Electric	Washington Water Power	Pacific Power & Light	Composite
System Energy Load	824	1834	1750	892	2809	8109
Hydro Resources–Critical						
System	337	148	218 ②	348	377	1428
Contract	—	812	336 ②	143	247	1538
Canadian Entitlement Return	—	-36	-21	-7	-14	-78
Restoration	6	-13	-3	7	17	14
	343	911	530 ②	491	627	2902
Major Thermal Resources						
Bridger	—	—	—	—	984	984
Dave Johnston	—	—	—	—	637	637
Centralia	—	225 ①	23 ②	165	428	821
Wyodak	—	—	—	—	230	230
Trojan	—	—	516 ②	—	24	540
Boardman	—	—	318 ②	—	—	318
Colstrip 1 & 2	270	280	—	—	—	550
Colstrip 3	63	53	39	32	23	210
Corette	139	—	—	—	—	139
	472	558 ①	896 ②	177	2326	4429
Other Thermal						
Combustion Turbines	—	12	20	3	—	35
Combined Cycle Turbines	—	—	301 ②	—	—	301
Renewables, Co-gen, etc.	—	—	18	32	59 ③	109
	0	12	339 ②	35	59	445
Net Contracts						
CSPE	—	176	104	25	47	352
WPPSS #1	68	68	68	68	68	340
Hanford Extension	38	40	40	40	43	201
Others	8	0	-3	57	18	80
	114	284	209	190	176	973
Maintenance						
Hydro	0	0	—	-2	-9	-11
Thermal (inc. Col. #3)	-35	-44	—	-14	-208	-301
Surplus/Deficit (–)	+70	-113	+224	-15	+162	+328
Median or 40 yr. avg. H2O Adder	+67	+200	+115	+125	+165	+672

Cost of Delay of Colstrip #3

3/15/82

Composite Surplus/Deficit(-)	+328 avg. Mw.	
<u>Less Oil or Gas fired Resources</u>		
Restoration	14	12000 Btu/kwh., $7.12/mm Btu
Combustion Turbines	35	
Combined Cycle Turbines	301	— 9,000 Btu/kwh., $7.12/mm Btu
Surplus/Deficit(-) w/o oil or gas	-22	
less Colstrip 3	-210	
Surplus/Deficit(-) w/o oil, gas, or Colstrip #3	-232	Avg. Mw X 730 hrs/mo. = 169,360 Mwh/mo. $(9000 \times 7.12 - 10800 \times 0.661) \times 10^{-3}$ = $9,644,000/mo. difference in fuel costs.

Cost of AFUDC/month = 10,000,000

Total Cost of 1 month delay (no credit for lost surplus sales) $19,644,000

Note: The above figures assume 201 avg. Mw. of Hanford Extension will be available - no contract exists.

All figures are annual avg. figures which do not account for severe winter and other monthly shaping problems.

APPENDIX D

Critical Water Delay Costs: Only Deficient Utilities
Purchase Replacement Energy

	MPC	Puget	PGE	WWP	PPL	TOTAL
1. Surplus[a]	70	- 113	+ 224	- 15	+ 165	
2. Back out oil fired energy						
(a) restoration	- 6	+ 13	+ 3	- 7	- 17	
(b) combustion turbines		- 12	- 20	- 3		
(c) combined cycle			- 301			
3. Adjusted surplus	+64	- 112	- 94	- 25	+ 145	
4. Less Colstrip	-63	- 53	- 39	- 32	- 23	
5. Net surplus	+ 1	- 165	- 133	- 57	+ 122	
6. Replacement[b]	0	53 Av. MW	39 Av. MW	32 Av. MW	0	
7. Cost/kWh replacement[c]	N/A	78.3 mills	53.4 mills	78.3 mills	N/A	
8. Cost/month delay[d]	0	$ 6.1 million	$ 3.0 million	$ 3.7 million	0	$12.8 million
9. Cost/kWh replacement[e]	N/A	53.4 mills	53.4 mills	53.4 mills	N/A	
10. Cost/month delay[d]	0	$ 4.1 million	$ 3.0 million	$ 2.5 million	0	9.6 million

NOTES:

a From MPC transmittal "1983-84 Colstrip 3 & 4 Participants Load/Resource Tab," 3/15/82 - by phone. (Attachment C)

b MPC and PPL are surplus even without Colstrip 3; the others must find additional replacement energy. Since Colstrip enters only for half the year, actual monthly replacement is twice the annual average.

c Assumes PGE runs Beaver plant to replace lost Colstrip 3 energy; Puget and WWP run combustion turbines and purchase oil fired energy.

d For example Puget needs 106,000 kW x 730 hours x $.0783/kWh = $6.1 million.

e Assumes Beaver plant replaces lost Colstrip energy for PGE, Puget and WWP.

MONTANA

DEPARTMENT OF NATURAL RESOURCES

& CONSERVATION

Helena, Montana

graphics by the

cartography bureau

300 copies of this public document were published at an estimated cost of $1.67 per copy, for a total cost of $500.91, which includes $500.91 for printing and $.00 for distribution.